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ABSTRACT

This report summarizes expert panel presentations and large and small group discussions focused on identifying educational opportunities as part of a public education effort to prevent obesity. Panel 1 reported on the epidemiology of obesity and cardiovascular disease, including obesity in both children and adults. Panel 2 reported on school-based, family-based, and community-based obesity prevention programs. Panel 3 addressed a number of issues in public education about weight and obesity, including: nutrition in adolescence; obesity and the hazards of treatment; smoking and weight; the role of physical activity in obesity management and prevention; and sociocultural aspects of obesity. Panel 4 examined communication strategies for public education, including audience segmentation as a strategy for targeting adults and communication strategies for targeting children and adolescents. Small group reports address special demographic issues pertaining to children, adolescents, adults, older adults, and minority group populations. (Individual panel papers and small group reports contain references.) (PB)

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STRATEGY DEVELOPMENT WORKSHOP

for Public Education on

WEIGHT AND OBESITY

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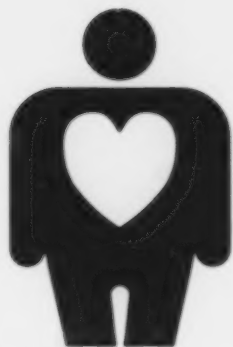
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Summary Report

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NHLBI
Obesity
Education
Initiative

Strategy Development Workshop for Public Education on Weight and Obesity

September 24-25, 1992

Summary Report

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EXECUTIVE SUMMARY

In the United States, the prevalence of obesity has been on the rise despite an increasing preoccupation with weight loss. According to preliminary data from the 1988-91 National Health and Nutrition Examination Survey (NHANES III),* the prevalence of overweight has increased from 25 to 33 percent during the past 10 years. The age-adjusted prevalence of overweight is 32 percent for men and 35 percent for women, compared with 24 percent for men and 27 percent for women in the NHANES II (1976-80). Although the NHANES III has yet to be analyzed for children, the NHANES I (1971-74) and the NHANES II both documented an increasing prevalence of obesity in children ages 6-17 years.

Obesity contributes to at least half the chronic diseases in Western societies. Heart disease remains the number one killer of Americans, and obesity or overweight is known to influence the impact of this disease on the population. Obesity is associated with an increased risk for hypertension, diabetes, high total blood cholesterol, and low high density lipoprotein (HDL) cholesterol. Obesity is also an independent risk factor for coronary heart disease. In some studies, even mild to moderate overweight is associated with a substantial elevation in coronary risk. Other studies show the effects of weight gain to be dependent on the age of onset.

A more complex issue is the relationship of weight and weight loss to all-cause mortality. Various studies demonstrate a U- or J-shaped curve with the highest and lowest levels of weight associated with the greatest mortality. Although studies show weight loss to be associated with improvements in blood pressure and blood cholesterol levels, weight loss also has been shown to be associated with higher mortality. It is unclear whether weight loss is causally related to the increase in mortality or weight loss and mortality are a consequence of illness.

*Preliminary data from the NHANES III were released in spring 1994 (National Center for Health Statistics, 1994). These new data are presented in the Executive Summary of this report.

Millions of overweight Americans who are attempting to lose weight often are unsuccessful over the long term. Data show that many individuals regain one-third to two-thirds of intentionally lost weight within 1 year and regain the rest of the weight within 5 years. In addition, many people are engaging in weight loss practices without the necessary medical supervision or monitoring.

The problem of obesity and overweight is multifaceted and involves complex questions that have no simple solutions. Attention needs to be focused on a variety of fronts, from the standpoint of treatment for those thousands of Americans who suffer from this condition and are at increased risk for not only heart disease but other diseases as well. Efforts to help prevent obesity in both children and adults must begin to help alleviate much of the pain and suffering that ultimately result.

PANEL 1: THE EPIDEMIOLOGY OF OBESITY AND CARDIOVASCULAR DISEASE

Obesity in Children

Consensus has yet to be reached on both a standard definition and a standard measurement technique for determining obesity in children. Definitions used for adults cannot easily be applied to children. Because childhood obesity does appear to track into adulthood and obesity is related to elevated cardiovascular risk factors in children, health consequences are associated with childhood obesity.

Etiology of obesity in childhood is complex and involves genetic, dietary, physical activity, and socioeconomic factors. Longitudinal studies with consistent use of the various measures to determine obesity would provide a better understanding of the etiology of obesity in children.

Obesity in Adults

The lack of a standard definition and standard measurement technique for determining overweight and obesity in adults makes it difficult to assess the impact of excess weight on health accurately. The NHANES data and definition provide a reference base for comparing studies and examining trends.

The latest data from the NHANES III indicate that approximately one-third of the U.S. adult population (ages 20 to 74) is overweight (defined as body mass index greater than or equal to 27.8 for men and greater than or equal to 27.3 for women; these cutpoints represent the sex-specific 85th percentiles for persons ages 20 to 29 in the NHANES II). Adult obesity in the United States has been increasing in both men and women and in both African Americans and whites. Overweight is disproportionately higher in African-American and Mexican-American women. The

age-adjusted prevalence of overweight is 50 percent among African-American women and 48 percent among Mexican-American women, compared to 33 percent among white women.

Obesity is related to elevated cardiovascular risk and to mortality. Furthermore, weight gain exacerbates cardiovascular risk factors whereas weight loss improves these conditions. Maintaining weight loss over the long term, however, is difficult.

Race, education, parity, acculturation, physical activity, caloric intake, and genetics are the etiologic factors that need to be considered. Increased attention to the prevention of obesity in early adulthood is needed, but determining what recommendations should be given to already obese adults is an equally great challenge.

PANEL 2: STRATEGIES FOR OBESITY PREVENTION

Interventions to help prevent obesity have included a variety of settings such as schools, clinics, families, communities, and other populationwide approaches. Interventions of this nature often consider age, gender, ethnicity, and geographic location.

School-Based Obesity Programs

School-based obesity programs offer the opportunity to reach a large number of children, especially younger children, on a daily basis for a number of years. They also offer multiple opportunities through the physical education curriculum, the school lunch program, other environmental changes, and the summer school program. School programs could tackle both prevention and treatment issues with complementary strategies and could initiate health education services for peer groups, families, and school staff. An important consideration for school-based programs is whether comprehensive programs can be implemented successfully over the long term in schools that already face limited resources. Nevertheless, schools remain an important vehicle for influencing the environment of many children.

Family-Based Obesity Programs

Family-based obesity programs in which both generations and all family members participate present a promising avenue for the prevention and treatment of obesity. Variables such as diet, food availability, and family environment including activity level and behavioral support can be manipulated so that the largest possible impact is felt by children and parents. Family-based obesity programs target the

family's behaviors and environment and ensure that parents play an active role in the intervention.

Community-Based Obesity Programs

Because the problem of obesity is pervasive, affecting all segments of the population regardless of age, race, or gender, it can be viewed as a community problem that requires community-based interventions that can bring about change. Community-based programs potentially can reach large numbers of individuals at a reasonable cost.

PANEL 3: ISSUES IN EDUCATING THE PUBLIC ABOUT WEIGHT AND OBESITY

Cultural factors influence knowledge, attitudes, and behaviors regarding food consumption and activity patterns and thus can influence weight and even body shape. Our culture currently places greater emphasis on the food intake side of the energy balance equation, with limited importance given to energy expenditure. In fact, our language is deficient in terms to describe the desire to engage in physical activity. Language as well as many other cultural factors should be examined closely when educating the public about weight and obesity.

Smoking and Weight

Smoking and body weight have been linked for many years; many people who begin smoking lose weight, whereas many who quit smoking gain weight. The concern about weight for smokers can predict in part their success at quitting; current smokers are much more likely than ex-smokers to consider weight loss as important. If individuals do not expect weight gain after quitting smoking, they are more likely to quit. Therefore, public messages related to weight and smoking need to communicate the relative risks related to smoking versus the weight gain associated with cessation. Particular target audiences for messages are adolescent females and adult women.

The Role of Physical Activity in the Prevention and Management of Obesity

Modest increases in physical activity appear to assist weight control and offers other benefits such as changes in body composition, psychological well-being, and reduced risks for cardiovascular disease. Increased physical activity and improved fitness also contribute to an improved quality of life, particularly during aging.

Both the general population and obese individuals, however, report numerous barriers to regular exercise, such as perceived lack of time, boredom, embarrassment,

and inaccessibility of facilities. Ways of encouraging the public to incorporate physical activity into daily routines need to be explored.

Sociocultural Aspects of Obesity

Viewing obesity in the larger context of social and cultural values provides possibly the most important insights into the underlying factors. Social patterns, social explanations, and social consequences of obesity are all important considerations.

Social development--helping societies change their value systems about thinness, physical activity, and low-fat diets--may be an important intervention goal. Education, resources, and the environment might be the best interventions. Insights and interventions from sociology would aid in efforts at dealing with obesity in the society.

PANEL 4: COMMUNICATION STRATEGIES FOR EDUCATING THE PUBLIC

Communicating messages to various audiences as part of a broad-based information campaign requires a multistage process. A communication strategy statement needs to be developed to summarize the health problem, identify primary and secondary target audiences, and develop possible messages and appropriate channels for the various target audiences. Success at communicating messages to the wide variety of audiences is more likely if multiple levels of social organizations are targeted. The most successful communication campaigns have used multiple yet complementary educational strategies.

Targeting Adults

Social marketing strategies are being used increasingly in health education to promote attitudes, behaviors, and lifestyles that can prevent illness or minimize its consequences. One important social marketing strategy is audience segmentation that permits a large, undifferentiated group to be broken down into smaller, homogeneous subgroups based on lifestyles, values, attitudes, behaviors, or other characteristics. This type of analysis allows campaign planners to better understand their target audience and therefore to better communicate appropriate messages to them.

Targeting Children and Adolescents

In terms of public education, a population-based approach rather than an individualized approach for high-risk audiences appears to be the most appropriate communication strategy for reaching obese children and adolescents. Healthful eating

and physical activity should be emphasized rather than dieting. It is impossible to predict with certainty which children are at particularly high risk. Thus, different yet complementary educational strategies are essential to getting the message out to various target groups. Because of possible adverse effects from any type of communication campaign, some form of evaluation should be incorporated from the start.

SMALL GROUP REPORTS

Five potential target audiences for the educational messages from the National Heart, Lung, and Blood Institute Obesity Education Initiative (NHLBI OEI) were identified--children, adolescents, adults, older adults, and minority populations. Small groups discussed each of these audiences in terms of their unique characteristics, particularly as they relate to issues of weight or patterns of eating and physical activity. For each target audience, the small groups addressed content-appropriate messages, source credibility in the delivery of messages, motivational strategies that encourage action, and appropriate communication channels to deliver messages.

Small Group Report: Children

The entire population of children ages 2 to 11 was identified as the priority target audience for a population-based approach to primary prevention. This approach was more acceptable than targeting high-risk obese children to avoid possibly increasing chronic dieting and eating disorders as well as stigmatizing obese children. Messages should be tailored to the various developmental stages of children, and messages should be targeted simultaneously to those who influence children. Messages for children at high risk need to be developed separately and carefully.

Two major public health messages were recommended for this priority target audience: (1) be more active and (2) eat less fat and eat healthier. A variety of ways to convey this information were suggested.

Small Group Report: Adolescents

As with children, the entire adolescent population (ages 11 to 17) was identified as the priority target audience with the emphasis on primary prevention. Again, concern was raised regarding national messages on obesity and weight that might further stigmatize high-risk adolescents.

The importance of healthy eating combined with physical activity should be the cornerstone message not only focusing on preventing obesity but on other potential health benefits as well. The idea that there is a broad range of safe weights and acceptable shapes also needs to be conveyed.

In terms of credible sources, peer groups have the most powerful influence on adolescents. Parents, role models, various members of the school staff, health providers, and the Government are also influential and could be used to educate adolescents and groups that communicate to adolescents.

A variety of motivational strategies and appropriate channels of communication were suggested to encourage healthy eating and physical activity. However, to improve and enhance the effectiveness of messages and strategies targeted to adolescents, formative evaluation and research are needed regarding their health knowledge, the effectiveness of different messages, and the various methods of communication that produce the desired outcomes.

Small Group Report: Adults

All men and women, ages 18 to 65, particularly those of low socioeconomic status and with low education levels, were identified as the primary target audiences. Messages to these different audiences must encourage healthy eating behaviors and increased physical activity and must emphasize that weight gain is an unrecognized health hazard as people get older.

Suggested strategies to reach these audiences ranged from the need for messages to be simple, positive, and attainable, to the need for environmental changes in restaurants and supermarkets. Health care providers and organizations were cited as a particularly credible sources that need to provide more information about issues related to weight.

Small Group Report: Older Adults

Americans over age 65 are a growing segment of the population. Overall characteristics of older adults include a preponderance of women, a broad range of educational levels and socioeconomic status, more leisure time, and a desire to remain independent. Advancing age also may bring decreased mobility, a decline in physical functions, higher rates of chronic disease, malnutrition, and social isolation.

Concern or lack of concern among older adults about overweight must be put into the context of many other, perhaps more urgent, health issues. Older adults are less likely to be concerned about overweight and more likely to be concerned about undesired weight loss. Among this population, there is greater concern about health and less concern about appearance.

Physical activity for older adults was noted as very important for many reasons including maintaining lean body mass and bone density and preserving strength and endurance. However, older adults have greater difficulty exercising combined with a great fear of injury.

Motivational strategies for older adults need to consider numerous factors including health status, cultural differences, climatic and environmental concerns, fear of ill health, and cost. Suggested channels of communication included many advocacy, volunteer, and health organizations that address issues pertinent to older adults.

Small Group Report: Minority Populations

The four major minority populations in the United States--African Americans, Hispanic Americans, Asians and Pacific Islanders, and Native Americans--are the fastest growing segments in the total U.S. population. These groups also tend to exhibit similar demographic characteristics such as high poverty rates, high high-school dropout rates, limited access to health care and food, high levels of risk factors and incidence of disease, and variant health knowledge and practices.

African-American women, ages 20 to 25, should be a priority target audience because of the particularly high prevalence of overweight and obesity in African-American women. Adolescent African-American girls also should be a priority target--in terms of primary prevention--because excessive weight for this population begins around puberty. The other minority groups also were noted as important targets of information concerning primary prevention of overweight.

Because of traditional gender roles and strong family units prominent in minority cultures, messages about healthy eating should target women and messages about physical activity should target men. The overall goal should be to give these populations a sense of empowerment and to increase their self-esteem.

In developing messages for different minority groups, it is essential to segment populations according to country of origin, how long they have been in the United States, and their degree of acculturation. Education efforts should begin with a campaign to raise awareness, followed by targeting individual lifestyles for change.

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INTRODUCTION

The National Heart, Lung, and Blood Institute (NHLBI) has been a leader in developing and fostering educational messages, materials, and activities and disseminating them to both health care providers and the public to help reduce cardiovascular disease (CVD) morbidity and mortality. These educational activities evolve from the wide array of research investigations supported by the NHLBI, ranging from basic science at the cellular level to education and demonstration studies carried out in communities.

For several decades, NHLBI-supported research on obesity has been fundamental to the understanding of overweight and obesity as they contribute to the cardiovascular disease burden of the Nation. The health implications of obesity have been documented and include an independent increased risk for CVD as well as increased risks for hypertension, diabetes, hypertriglyceridemia, low levels of high density lipoprotein (HDL) cholesterol, and high levels of total and low density lipoprotein (LDL) cholesterol. Sleep apnea and impaired lung function, gall bladder disease, gout, and degenerative joint disease or osteoarthritis can occur with more severe obesity. In addition, obesity is associated with an increased mortality from certain types of cancer. The distribution of body fat (upper body versus lower body) appears to influence these health risks as well. For some, the psychological burden of obesity is more distressing than the physical consequences combined.

Based on this research and recognizing obesity as a major public health concern, Dr. Claude Lenfant, NHLBI director, inaugurated the NHLBI Obesity Education Initiative (NHLBI OEI) in January 1991. It is one of seven education programs coordinated by the Office of Prevention, Education, and Control. All of these programs are built on three foundations: a strong scientific basis; consensus building from a wide variety of professional organizations; and communications to targeted communities, patients, health care providers, and special populations such as minority groups or individuals with lower reading skills.

Accordingly, the Strategy Development Workshop for Public Education on Weight and Obesity, held on September 24-25, 1992 in Bethesda, Maryland, brought together leading experts from various areas of obesity research, communication specialists, and representatives from 37 professional organizations and Federal agencies. As the first major activity sponsored by the OEI, this workshop sought to address some of the important educational challenges related to weight control and CVD. Karen Donato, coordinator of the NHLBI OEI, welcomed participants, guests, and NHLBI colleagues to the workshop and provided background on the initiative, the objectives of the workshop, and the charge to the working groups.

The OEI was established by the Institute because of strong scientific evidence and need for educational messages and activities. The National High Blood Pressure Education Program (NHBPEP) was the first national education program, established in 1972. The Institute, in subsequent years, established four other national education programs based on the NHBPEP model. They include the National Cholesterol Education Program, the National Blood Resource Education Program, the National Asthma Education and Prevention Program, and the National Heart Attack Alert Program. In addition, the Institute has developed other types of educational programs and initiatives including the NHLBI Smoking Education Program and the NHLBI Obesity Education Initiative.

Because many of the NHLBI education programs deal with obesity-related issues, the OEI has been designed to coordinate and enhance obesity education activities across the national education programs, to take steps to advance the understanding of the complicated issues involved, and to promote additional research needed to clarify some of the questions that remain. It also takes into account the keen interest of the NHLBI Ad Hoc Committee on Minority Populations on obesity-related health concerns of diverse minority groups in this country.

The OEI also has recognized the need to work toward achieving the Healthy People 2000 Objectives for the Nation related to reducing the prevalence of overweight in the United States. One specific objective calls for a concerted effort to prevent the development of overweight in general, while facilitating weight reduction among the overweight. Five other national objectives focus on the impact of dietary habits and physical activity on the prevention of overweight.

The OEI differs from the other NHLBI education programs in that it does not have a coordinating committee composed of numerous professional organizations. Instead, the OEI consists of a task force with representatives from the various research divisions of the Institute, many of whom play important roles in the other national education programs and thus help ensure consistent messages across programs. The task force also convenes special ad hoc expert advisory panels to address specific issues and to help guide the initiative. In fact, this workshop evolved from planning meetings held in August 1991 in which a group of experts discussed

the determinants, consequences, and treatment issues related to obesity. Based on the recommendations from the planning meetings, the initiative has taken on both a high-risk strategy and a population-based strategy to educate professionals and the public. Both strategies are important in the management of obesity.

The high-risk strategy targets individuals who are experiencing, or who are at high risk for, the adverse health effects and medical complications associated with obesity. In implementing the high-risk strategy, an expert panel will address the issues related to the identification, evaluation, and treatment of obesity, specifically in individuals with other risk factors for CVD and lung problems.

The population-based strategy focuses on the prevention of obesity and its complications in the general public. From the many surveys already conducted, it is clear that the public has not only heard about weight control and obesity but has been inundated with information. However, the media often foster sociocultural ideals regarding body weight and physical appearance that are unrealistic for most people. In many instances, the messages that get communicated are not always accurate or realistic and often leave the public confused and vulnerable.

Voluntary weight loss attempts by large segments of the American population are now typical. The National Institutes of Health (NIH) Technology Assessment Conference on Methods for Voluntary Weight Loss and Control was held in 1992. The experts also reported that one-third of the population is overweight, and as many as 40 percent of women and 24 percent of men are trying to lose weight at any one time. The panel noted that a distressing health paradox now exists in American society. On the one hand, the pursuit of thinness has led many people, particularly young women, who do not need to lose weight to engage in weight loss practices; on the other hand, treatment methods have failed those people who might otherwise have benefited from weight reduction.

Because the issues surrounding obesity and overweight are complex and because the consequences of confusion can be serious, reaching a consensus on the messages that should be communicated and the audiences that should be targeted is imperative. The purpose of the NHLBI OEI is to educate the public about the relationship of overweight and physical inactivity to heart disease and lung function. The Strategy Development Workshop for Public Education on Weight and Obesity was convened to help devise an effective population-based strategy that would take into account the public's current perceptions, knowledge, attitudes, and behaviors regarding body weight in the hope of exerting a positive impact on reducing the high prevalence of obesity.

WORKSHOP OBJECTIVES

The purpose of the Strategy Development Workshop for Public Education on Weight and Obesity was to involve a group of knowledgeable professionals in a collaborative planning process to assist in identifying educational opportunities that could become part of a public education effort on obesity prevention. Four expert panel presentations followed by large and small group discussions provided the structure for the workshop. Participants were asked to consider:

- the issues in educating the public about weight and physical activity and their relationship to cardiovascular and lung diseases;
- the priority target audiences for the NHLBI Obesity Education Initiative;
- the education needs of each target audience in terms of basic knowledge, skills, and behaviors regarding weight, overweight and obesity, and physical activity, and their relationship to cardiovascular and lung diseases;
- the public education approaches that would most effectively communicate the information, attitudes, and skills that members of each target audience need in order to change their behaviors regarding weight, physical activity, and eating patterns; and
- the communication channels that are appropriate for reaching each target audience and the roles that a wide range of organizations can play in disseminating public education messages and in developing local educational program activities.

This report summarizes the activities of the workshop.

PANEL PRESENTATIONS

- Panel 1: The Epidemiology of Obesity and Cardiovascular Disease
- Panel 2: Strategies for Obesity Prevention
- Panel 3: Issues in Educating the Public About Weight and Obesity
- Panel 4: Communication Strategies for Educating the Public

PANEL 1: THE EPIDEMIOLOGY OF OBESITY AND CARDIOVASCULAR DISEASE

The panel on the epidemiology of obesity and cardiovascular disease was chaired by Dr. JoAnn E. Manson, Brigham and Women's Hospital and Harvard Medical School. She provided an overview of the extent and complexity of the problem. Dr. Eva Obarzanek, NHLBI Division of Epidemiology and Clinical Applications, examined obesity in children by looking at definition and measurement issues, the health consequences related to cardiovascular risk factors, and etiological complexities. Dr. Diane Bild, NHLBI Division of Epidemiology and Clinical Applications, focused on obesity in adults and discussed health risks as well as demographic and etiological factors related to obesity. The panel concluded with general discussion and comments by attendees.

INTRODUCTION--JoAnn E. Manson, M.D., Dr.P.H.

Obesity contributes to at least half the chronic diseases in Western societies. In the United States, the prevalence of obesity has been slowly increasing despite an increasing preoccupation with weight loss. For African-American women, the prevalence of obesity is approaching near epidemic proportions (National Center for Health Statistics, 1987).

Long-term success rates of weight loss efforts are equally discouraging. Data presented at the NIH Technology Assessment Conference on Methods for Voluntary Weight Loss and Control in March 1992 showed that many individuals regain one-third to two-thirds of intentionally lost weight within 1 year, with the rest of the weight returning within 5 years (National Institutes of Health, 1992).

Statistics also support an increasing prevalence of obesity in the United States in children ages 6 to 11 years and a similar increase in children ages 12 to 17 years. Physical inactivity and diet appear to be leading contributing factors. According to *Morbidity and Mortality Weekly Report*, only 35 percent of U.S. high school students attend physical education classes daily, and only 13 percent consume the recommended five daily servings of fruits and vegetables (Centers for Disease Control, 1992).

Obesity's association with insulin resistance--often referred to as syndrome X--is characterized by an elevated risk of glucose intolerance, high insulin levels, increased very low density lipoproteins (VLDL), elevated triglycerides, decreased HDL-cholesterol levels, and high blood pressure. Individuals at particularly high risk for this syndrome are those with abdominal obesity, or a waist-to-hip ratio of greater than 0.95 in men and greater than 0.80 in women (Bjorntorp, 1985).

Various studies have linked body weight and mortality. An increased risk of all-cause mortality among the obese was demonstrated in the 1959 Build and Blood Pressure Study, the 1979 Build Study, and the 1979 American Cancer Society Study (Society of Actuaries, 1959; Society of Actuaries and Association of Life Insurance Medical Directors of America, 1980; Lew and Garfinkel, 1979). However, these same studies also showed a J-shaped curve, or an increasing risk of mortality among the lean.

Cigarette smoking has been cited as one of the confounders in most previous studies because smoking is associated with lower body weight as well as increased mortality. Twenty-six-year followup data on Seventh-Day Adventists showed a clear linear association between body weight and all-cause mortality, with the leanest men having the lowest mortality (Lindsted et al., 1991). More research is required in this area to determine whether any health risks are associated with leanness as well as the magnitude of the risk associated with mild-to-moderate obesity (Manson et al., 1987).

Prevention and treatment of obesity in children and adults involves complex questions that have no simple solutions. Of primary importance, attention needs to focus on the prevention of obesity in both children and adults.

OBESITY IN CHILDREN--Eva Obarzanek, Ph.D., R.D.

Describing the extent of the problem of obesity in children involves not only examination of the prevalence and distribution of obesity through childhood, but also consideration of its definition and measurement, relationship to cardiovascular risk factors, tracking into adulthood, and etiology. The following sections explore some of these complex issues.

Definition and Measurement Issues

The two main difficulties of accurately describing the epidemiology of obesity in children are related to issues of definition and measurement. Different methods of measuring obesity yield different results, different definitions, and different interpretations of the cardiovascular risks of pediatric obesity.

Weight alone is not a good measure of obesity because of its dependency on height. Body mass index (BMI, kg/m^2) has been used extensively in epidemiological studies because it is a measure of weight that is relatively independent of height, can be measured easily, and appears to be moderately well correlated with body fat in adults and children. For growing children, however, the interpretation of BMI is more of a problem because the rate of weight gain may not be in step with the rate of height gain. This means that BMI may fluctuate as children are tracked during their growing years. BMI also carries with it components of frame size and lean body mass that greatly increase--more so than fat--during childhood.

A second measure frequently used to assess obesity is skinfold thickness. Skinfold measures have the advantage of being direct measures of fat; however, compared to measures of height and weight, they are less easily and less reliably measured.

The 1976-80 National Health and Nutrition Examination Survey (NHANES II) (National Center for Health Statistics, 1987) data for 7,000 children between the ages of 2 and 18 years indicated that for both boys and girls BMI declines slightly in the early years and then begins to increase throughout the teenage years (figures 1 and 2). On the other hand, when body fat was measured using triceps skinfold (TSF) measurements, the results differ. For both boys and girls, TSF measures increase from early childhood through puberty, ages 9 to 12; TSF measures then decline during the teenage years for boys but continue to rise for girls (figures 3 and 4).

Ethnic differences in TSF measures are evident in comparing the NHANES II data and the 1982-84 Hispanic Health and Nutrition Examination Survey (HHANES) data (National Center for Health Statistics, 1989). From age 2 through the teenage years, TSF measures were lower for African-American boys, and similar or slightly higher for Mexican-American boys, than they were for white boys. In all age groups, TSF measures for African-American girls were lower than they were for white girls, until the teenage years when they become larger than for white girls. For Mexican-American girls, TSF measures were similar or slightly higher than those of white girls.

Figure 1. Median, 10th, and 90th Percentile Body Mass Index, Boys, Ages 2 to 18 Years

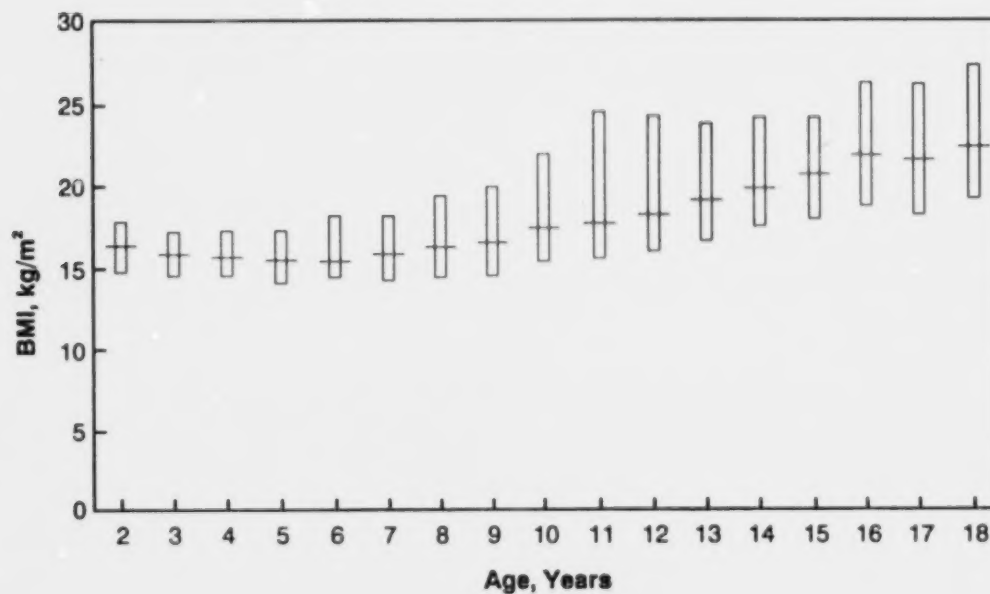
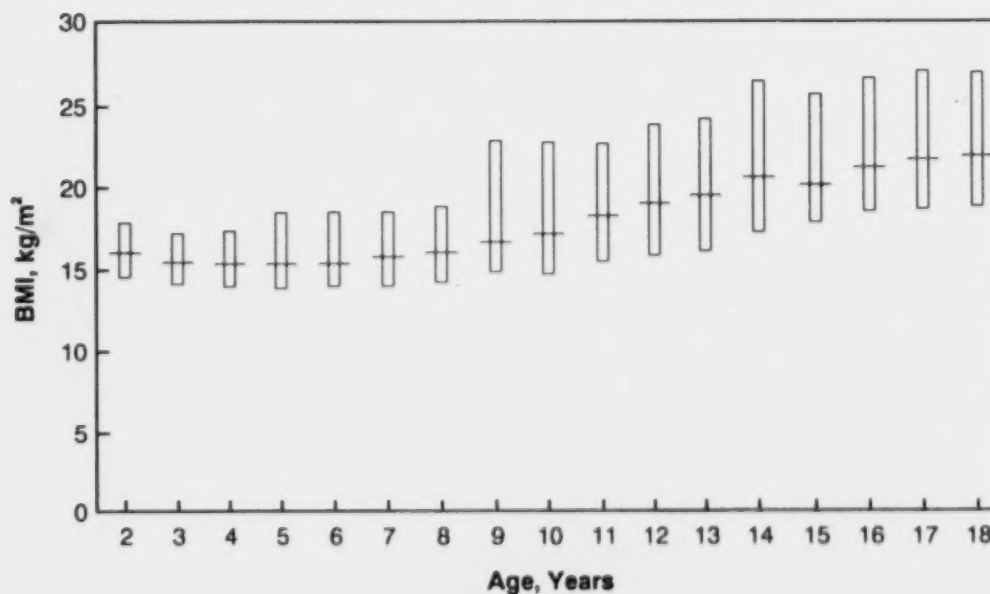


Figure 2. Median, 10th, and 90th Percentile Body Mass Index, Girls, Ages 2 to 18 Years



Source: NHANES II (National Center for Health Statistics, 1987)

Figure 3. Median, 10th, and 90th Percentile Triceps Skinfolds, Boys, Ages 2 to 18 Years

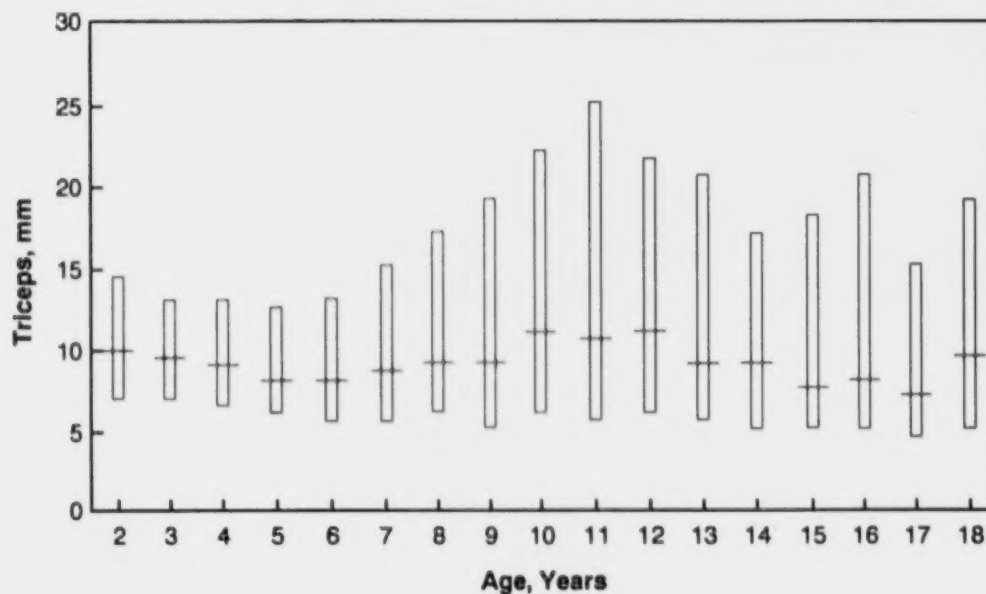
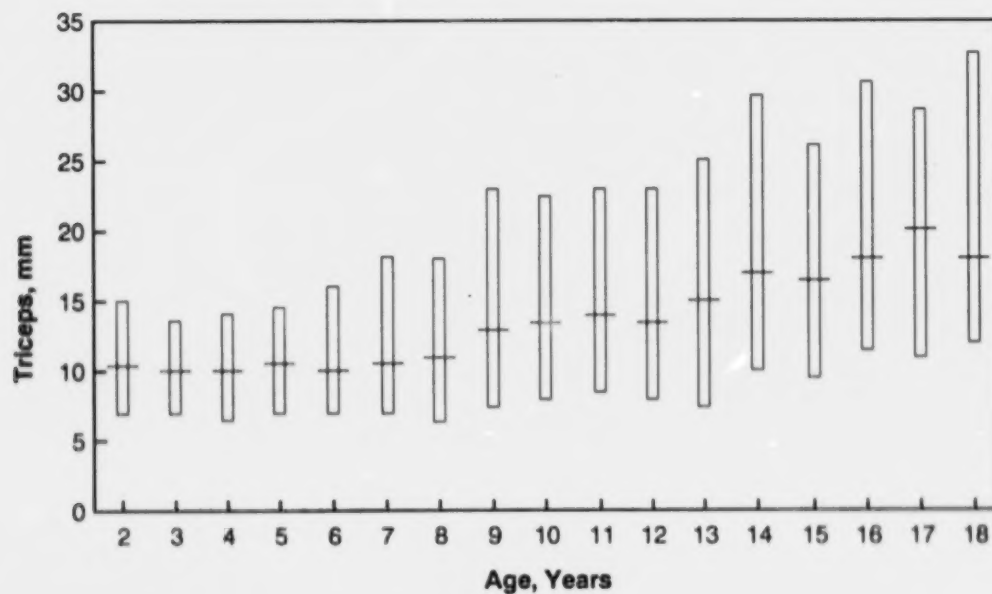


Figure 4. Median, 10th, and 90th Percentile Triceps Skinfolds, Girls, Ages 2 to 18 Years

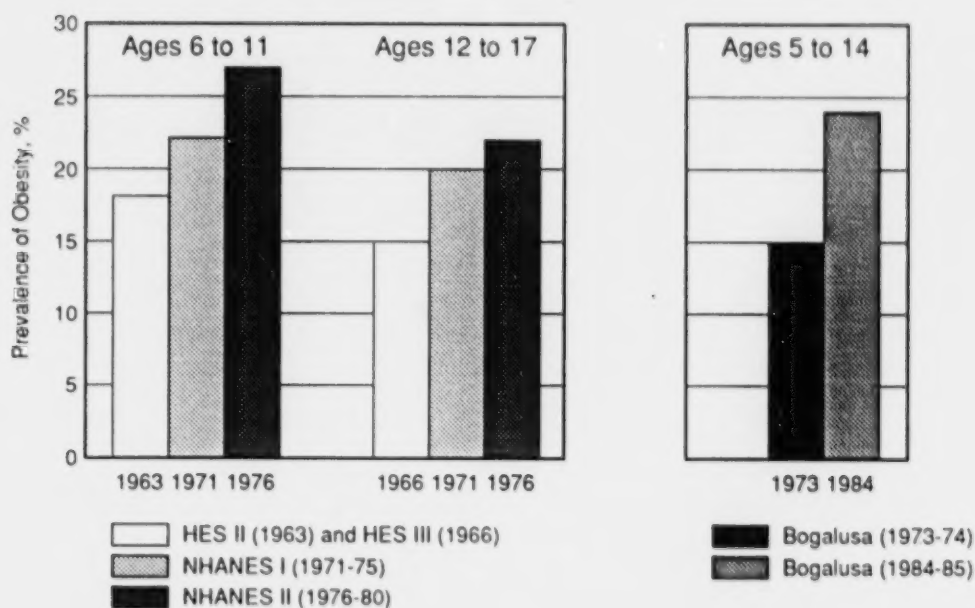


Source: NHANES II (National Center for Health Statistics, 1987)

Prevalence Data

In children, obesity--characterized by excess body fat--is often defined as greater than or equal to the 85th percentile for age and sex of TSF or BMI. Using the 85th percentile of TSF as a definition, Gortmaker and associates (1987) compared data from the Health Examination Surveys (HES) of the 1960s, the NHANES I (1971-74) and the NHANES II (1976-80) data. Using the HES as the reference population, across each succeeding survey, they found the prevalence of obesity increasing among children (figure 5). The NHANES II data showed the prevalence of obesity in

Figure 5. Increasing Pediatric Obesity--Triceps Skinfolds and Ponderal Index (kg/m^3)



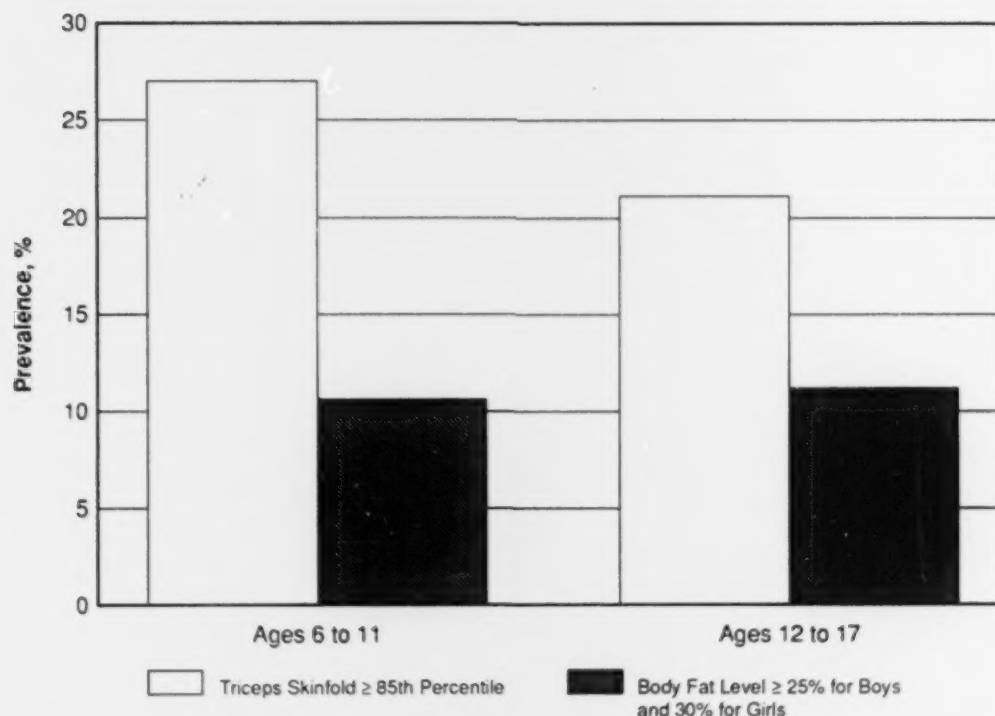
children ages 6 to 11 years at 27 percent--an increase of 20 percent from the NHANES I--whereas in 12- to 17-year-olds, the prevalence of obesity was about 22 percent--an increase of about 9 percent. Data from the Bogalusa Heart Study also showed an increase in the prevalence of obesity, defined as the 85th percentile of the ponderal index (kg/m^3), from 15 percent in 1973 to approximately 24 percent in 1984 in children ages 5 to 14 years (Shear et al., 1988).

More recent work, however, has shown that the 85th percentile of TSF may not be indicative of obesity in all cases because a given percentile represents different levels of body fat at different ages (Lohman et al., 1989). For example, the 85th percentile of TSF for boys at age 6 corresponds to 15-percent body fat, whereas for boys at age 12, the 85th percentile corresponds to 23-percent body fat. To adjust for

this, Lohman and colleagues proposed using percent body fat rather than percentiles of skinfolds or BMI to define obesity (Williams et al., 1992). They defined pediatric obesity as a body fat level greater than or equal to 25 percent for boys and greater than or equal to 30 percent for girls, derived from prediction equations using triceps and subscapular skinfolds, discussed later. Applying this definition to the NHANES II triceps and subscapular skinfolds data, the prevalence of obesity increases around the pubertal years for both boys and girls. The prevalence in obesity then declines sharply for boys throughout the teenage years but falls only slightly for girls.

Figure 6 compares the prevalence of obesity in children (NHANES II data) using the TSF percentile method versus the percent body fat method. In children ages

Figure 6. Prevalence of Pediatric Obesity Using Two Different Definitions for Obesity



Source: NHANES II (National Center for Health Statistics, 1987)

6 to 11 years, the prevalence of obesity is 27 percent when using the 85th percentile of TSF definition compared to 11 percent when using the percent body fat definition. Similarly, for teenagers ages 12 to 17 years, the prevalence of obesity is 22 percent

when the percentile method is used compared to nearly 14 percent when the percent body fat method is used. Further validation of percent body fat standards is required.

Tracking of Obesity

One of the health concerns regarding obesity in childhood is that obesity may continue into adulthood. Longitudinal studies have suggested that, although not all obese children become obese adults, obese children have a greater probability of remaining obese than would be expected by chance (Garn and LaVelle, 1985). In the Bogalusa Heart Study, for example, 49 percent of children ages 5 to 14 years who were initially obese (in the 90th percentile of TSF measurements) were obese in the 5-year followup, and 43 percent remained obese in the 8-year followup (Freedman et al., 1987). In the Tecumseh Community Health Survey, 26 percent remained obese after 20 years (Garn and LaVelle, 1985). This risk of remaining obese appears to be greater when obesity occurs later in childhood (Harsha et al., 1987). More research on the tracking of obesity is needed.

Relation to Cardiovascular Risk Factors

Studies have linked health consequences, including the development of risk factors for CVD, with childhood obesity (Aristimuno et al., 1984). Children who gain the most weight have the greatest increase in cardiovascular risk factors, and children in the upper quintile of body weight are more likely to develop two or more cardiovascular risk factors (Smoak et al., 1987). In addition, data from the Bogalusa Heart Study showed that central body fat (as measured by suprailiac and subscapular skinfold thickness) is related to adverse lipid profiles, independent of overall body fat (Freedman et al., 1989). Similar results also were found for blood pressure (Shear et al., 1988).

Lohman and colleagues, using their proposed definition of obesity as percent body fat, have tried to determine a cut point or level of body fat that is associated with elevations in cardiovascular risk factors in children (Williams et al., 1992). If no relationship existed between obesity and cardiovascular risk factors, 20 percent of all children across all quintiles of percent body fat would develop high blood pressure. However, Lohman determined that 35 percent of boys were in the top quintile for blood pressure when body fat levels reached 25 percent. For girls, the frequency of high blood pressure increased when body fat levels reached 30 to 35 percent. Similar levels of percent body fat also were associated with the top quintile for total cholesterol levels.

Etiology

The etiology of obesity in children is complex. Familial and genetic factors are among those associated with obesity in children. For example, Mayer (1965) showed that offspring of two obese parents have an 80-percent chance of becoming obese, as compared to a 14-percent chance for offspring of two parents of normal weight. These data indicate that obesity is related to familial factors that are transmitted through heredity, through a shared environment, or through both. However, subsequent studies on twins and adoptees have shown that body fat is transmitted genetically to a moderate extent (Stunkard et al., 1986a, 1990; Bouchard et al., 1988; Sorenson et al., 1989). Studies have shown that the correlation for measures of body fat in pairs of relatives increases as the relationship gets closer. Furthermore, siblings by adoption have no significant correlation in body fat whereas related siblings do. The correlation increases with dizygotic twins and is highest for monozygotic twins (Bouchard et al., 1988). Bouchard has estimated that about 25 percent of the variation in body fat is genetic. Thus, much of the variation in body fat is due to environmental factors.

Environmental factors that are expected to play a key role in body weight are diet and physical activity. A significant, direct relationship between energy intake and body weight has generally not been found in children (Rolland-Cachera and Bellisle, 1986). Studies relating physical activity with body weight are inconsistent (Sunnegardh et al., 1986). Furthermore, most studies do not show that obese children eat more than lean children (Durnin et al., 1974), and only a small number of studies show that obese children are less physically active than lean children (Tell and Vellar, 1988; Bullen et al., 1964). However, dietary and physical activity assessment methods are extremely imprecise, and caloric intake estimates especially have high intraindividual variation. Large errors of measurement and high individual variability make it difficult to detect significant relationships.

Hours of television viewing have been linked to the prevalence of obesity. Dietz and Gortmaker (1985) found that, in a national sample of children ages 12 to 17 years, the prevalence of obesity (defined by the 85th percentile of TSF measurements) increased 1.9 percent for each hour per day spent watching television. Whether the increased prevalence of obesity is a result of decreased physical activity or of increased snack intake as a result of watching television needs to be investigated further.

Socioeconomic status has been found to be related to obesity in adults. However, no overall trend is discernible in children. In a review by Sobal and Stunkard (1989), about one-third of the studies found a positive association, one-third a negative association, and one-third no association.

Summary

- A generally accepted definition of obesity in children is needed.
- The measures that define obesity in children need to take into account the natural history of fat deposition related to normal growth and development.
- Obese children have a higher probability of becoming obese adults, which may set the stage for premature CVD in adulthood. Furthermore, pediatric obesity is associated with cardiovascular risk factors in childhood.
- Environmental factors are important in obesity in children because genetics account for only a portion of the variation in obesity.
- Longitudinal studies with consistent use of the various measures would provide a better understanding of the etiology of obesity in children.

OBESITY IN ADULTS--Diane Bild, M.D., M.P.H.

An examination of obesity in adults needs to include an examination of the health risks and demographic factors associated with obesity, as well as other factors that may be causally related to obesity.

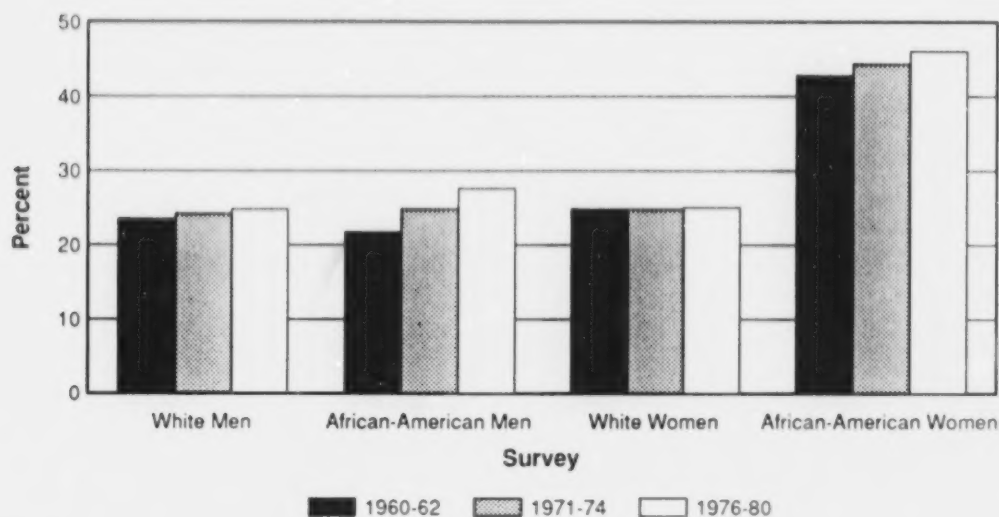
Prevalence

Difficulties of definition and measurement continue to be a problem in describing the epidemiology of obesity in adults. The NHANES II data and definition of obesity nevertheless provide a reference base for comparing studies and examining trends. Approximately one-fourth of the American population is overweight based on the NHANES II definition (greater than or equal to the sex-specific 85th percentile of BMI for 20- to 29-year-olds) (National Center for Health Statistics, 1981). As figure 7 illustrates, adult obesity in the United States has been increasing in both men and women and in both African Americans and whites. Of important note is the particularly high prevalence of obesity in African-American women.

Weight and Mortality

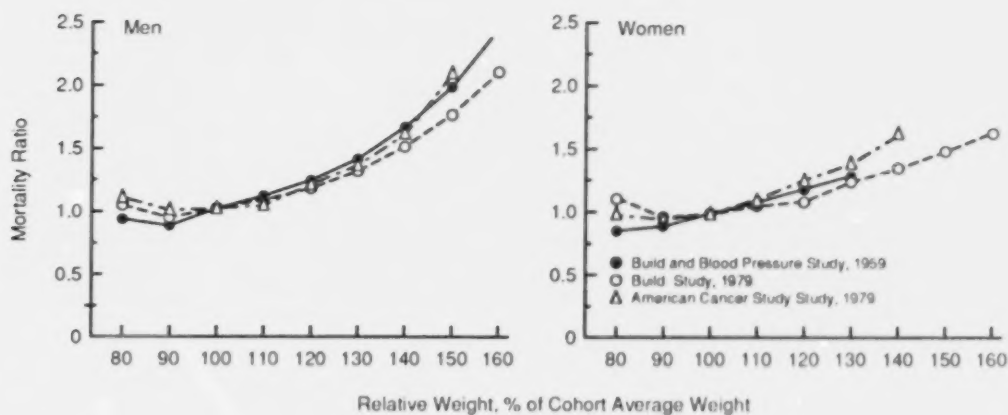
Data from three large studies--the 1959 Build and Blood Pressure Study, the 1979 Build Study, and the 1979 American Cancer Society Study--show an increase in mortality ratios for both men and women with increasing relative weights (figure 8). The J-shaped curve also indicates high mortality among those 20 percent below average weight. By failing to separate smokers from nonsmokers, the Build Studies overstate the mortality risks of having lower weight and understate the mortality risks

Figure 7. Secular Trends in Prevalence of Overweight in the United States



Adapted from Kuczmarski, 1992.

Figure 8. Mortality Ratios for All Ages Combined, by Relative Weight



Note: Mortality ratios for all ages combined, by relative weight. Results from three largest studies that provided relative weights are presented in relation to death rate of those of average weight within each cohort.

Source: Manson, 1987.

Adapted from Van Itallie, 1979.

of being overweight because smokers tend to weigh less and have higher mortality rates than nonsmokers. However, 28-year followup data from the Framingham Heart Study suggest increasing mortality with increasing weight, even after controlling for smoking (Higgins et al., 1988).

Weight and Cardiovascular Risk

The Framingham data demonstrated that higher quintiles of BMI are associated with increased levels of total cholesterol, systolic and diastolic blood pressure, glucose, and uric acid (Higgins et al., 1988). Furthermore, obesity was associated with an increased risk of coronary heart disease (CHD), independent of these risk factors. The Nurses Health Study of more than 120,000 registered nurses ages 30 to 55 found an increased risk of CHD associated with greater BMI (Manson et al., 1990). In this study, women with a BMI greater than or equal to 29 had almost double the risk of CHD compared to women with a BMI less than 21, after controlling for hypertension, diabetes, high serum cholesterol, and parental myocardial infarction.

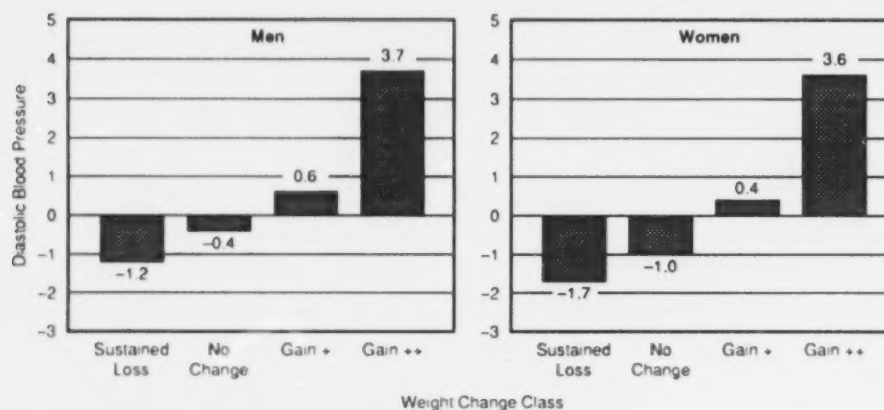
Weight Change and Cardiovascular Risk

Five-year data from the Coronary Artery Risk Development in Young Adults (CARDIA) study of 5,000 men and women ages 18 to 30 years at baseline (Friedman et al., 1988) provided insight into the effects of weight loss, weight maintenance (within 5 pounds), and weight gain on cardiovascular risk factors. Those who lost weight (initial loss of 5 pounds without regain of more than 5 pounds over 5 years) showed decreases in blood pressure, whereas those who gained showed increases in blood pressure (figure 9). Significant changes in HDL-cholesterol levels also were noted: Those who lost weight raised their HDL-cholesterol levels, whereas those who gained lowered their HDL-cholesterol levels (figure 10).

Weight, Race, and Socioeconomic Status

According to cross-sectional data from the NHANES II, the mean weight of both white and African-American men increased with age until the forties and then reached a plateau, whereas the mean weight for women increased throughout adulthood to age 74 (National Center for Health Statistics, 1981). Data from the CARDIA study showed that weight is not related to education level in white men, but that African-American men who are better educated have slightly higher BMIs than their less educated counterparts (Burke et al., 1990). African-American and white women with more education or with higher incomes have lower BMIs than those women with less education or lower incomes.

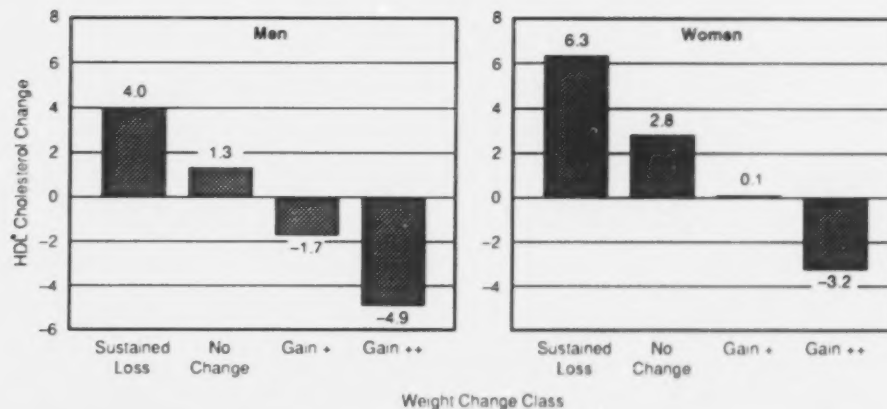
Figure 9. Change in Diastolic Blood Pressure by Weight Change Over 5 Years Among 18- to 30-Year-Old Men and Women, CARDIA



Sustained loss: Initial loss of 5 pounds without regain of more than 5 pounds
 No change: $\pm$ 5 pounds
 Gain+: Below sex-specific median for weight gain
 Gain++: Above sex-specific median for weight gain

Source: Unpublished data

Figure 10. Change in HDL by Weight Change Over 5 Years Among 18- to 30-Year-Old Men and Women, CARDIA



Sustained loss: Initial loss of 5 pounds without regain of more than 5 pounds
 No change: $\pm$ 5 pounds
 Gain+: Below sex-specific median for weight gain
 Gain++: Above sex-specific median for weight gain

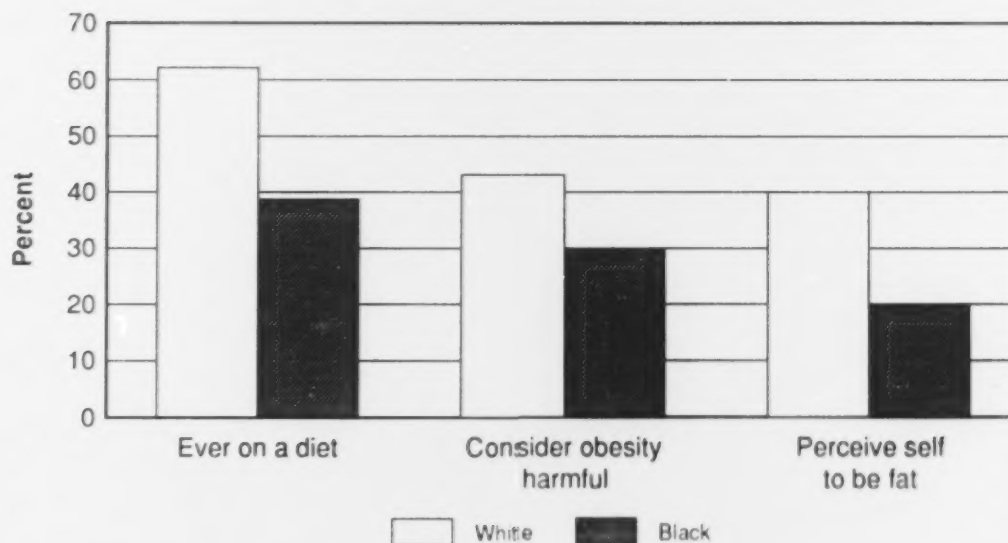
Source: Unpublished data

Etiology

An examination of the factors influencing obesity in the CARDIA study revealed no relationship between skinfold thickness and caloric intake in either men or women (Slattery et al., 1992). The absence of an effect could be due to difficulty in measuring caloric intake and to the fact that people who weigh more may be less active and therefore require fewer calories. Skinfold thickness and level of physical activity were significantly related in both men and women and in both African Americans and whites (Slattery et al., 1992). BMI also was correlated with fitness, as measured by duration on a treadmill test (Sidney et al., 1992). Again, interpretation of cause and effect is difficult: Do those who are more fit weigh less because of increased energy expenditure? Or are those who weigh more less active and therefore less able to perform well on a fitness test?

Attitudes and diet practices may play a role. In the CARDIA study, African-American women reported that they dieted, considered obesity harmful, and perceived themselves to be fat less often than did white women, despite the higher prevalence of obesity in African-American women (figure 11). Parity is also associated with BMI.

Figure 11. Attitudes and Practices Regarding Weight Control and Obesity in White and African-American Women, CARDIA



Adapted from Burke et al., 1992.

Women who have more children and women who give birth at an earlier age tend to have higher BMIs (Burke et al., 1992).

Genetic predisposition to obesity is an important factor. CARDIA data showed a definite relationship between parental obesity and skinfold thickness in offspring ages 18 to 30 years, with the relationship particularly strong when both parents are obese (Burke et al., 1991). A Danish study that compared adopted children to both their biological parents and adoptive parents also showed a strong correlation between children's BMIs and their biological parents' BMIs but not their adoptive parents' BMIs (Stunkard et al., 1986b).

Priorities

With many overweight individuals (46 percent of overweight men and 61 percent of overweight women) trying to lose weight and billions of dollars being spent annually on weight loss efforts, increased attention to the prevention of obesity is needed. An equally great challenge is determining what recommendations should be given to already obese individuals.

GENERAL DISCUSSION

Dr. JoAnn Manson stated that the benefits of long-term weight loss cannot yet be fully addressed because not enough individuals have sustained long-term weight loss. The evidence is clear, however, that weight loss has such cardiovascular benefits as lowering blood pressure and improving both lipid profiles and glucose tolerance. Furthermore, no clear evidence suggests adverse physiological effects from weight loss.

The panel members were asked whether they knew of any race differences in the physiological effects of obesity, considering there are race differences in the perceptions of obesity. Dr. Manson was aware of possible differences with diabetes. After adjusting for BMI, African-American women--and perhaps African-American men--may be at greater risk than whites for developing glucose intolerance and diabetes. The panelists were unsure whether there were greater risks of obesity for other end points. The greater prevalence of hypertension in African-American women as compared with white women is explained chiefly by the greater prevalence of obesity in that population.

Dr. David F. Williamson, Centers for Disease Control and Prevention, shared a recent article, "Childhood weight and growth rate as predictors of adult mortality" by Nieto and colleagues (1992), published in the *American Journal of Epidemiology*. The study showed that even in young children long-term health outcomes are adversely affected by obesity.

Dr. Williamson also commented that examining longitudinal data, as opposed to cross-sectional data, is a better way to look at weight gain over time. Based on NHANES I followup data, both men and women gain weight, at a decreasing rate, up to their mid-fifties, and women gain more weight than men. After that, with increasing age, they both lose weight, but women lose more weight than men.

Dr. Cheryl Ritenbaugh, University of Arizona, asked whether there are any data on cardiovascular risk in physically active individuals who weigh more. Dr. Manson cited the Nurses Health Study, which showed a strong independent effect of BMI and increasing CHD, after controlling for physical activity. Several epidemiological studies suggest that weight loss, whether by caloric restriction or physical activity, produces comparable effects on cardiovascular risk factors. Dr. Ritenbaugh responded that, from the standpoint of public health and prevention, consideration of what could be achieved by increasing levels of fitness without initial attention to weight loss was needed.

Dr. Robert W. Jeffery, University of Minnesota, asked whether the CARDIA investigators have looked prospectively at the relationship of reported dieting to weight gain or loss, or at the relationship of dieting to cardiovascular risk factors, after controlling for body weight. Dr. Millicent Higgins, NHLBI, stated that the prevalence of dieting was related to the change in body weight; however, only a very small number of individuals had actually sustained weight loss. Much of these data have not yet been analyzed fully.

Dr. Barbara C. Hansen, North American Association for the Study of Obesity, suggested that the intervention focus on primary prevention rather than on the promotion of weight loss, in light of the historical data on groups of people who have been calorically restricted (but not necessarily nutritionally deprived) and the studies that have been conducted in rodents. Dr. Manson agreed that the emphasis should be on primary prevention, not only because secondary prevention (reversing obesity) has such a dismal track record but also because of the questions that have been raised about the adverse health effects caused by weight loss and weight cycling. However, attention still must be given to the one-quarter to one-third of Americans who are already obese.

Dr. Peter Wood, Stanford University, asked about the relationship between obesity and cardiovascular morbidity and mortality in people age 65 and older. Dr. Manson responded with Framingham data, which showed similar findings on cardiovascular morbidity and mortality and BMI in this age group. There is evidence that lower weight produces better cardiovascular risk profiles in the older population. The only disease risk that has been found to be associated with leanness in women is osteoporosis and related fractures. In men, no disease appears to be adversely influenced by leanness.

William Fabrey, National Association To Advance Fat Acceptance, mentioned some research that showed that African-American men may suffer from higher rates of CVD that are attributable to oppression and asked whether any research has been conducted on the effects of high levels of stress and obesity. Dr. Bild stated that this was an area for further study but noted the difficulty in measuring psychosocial stress.

Dr. Millicent Higgins, NHLBI, expanded upon the discussion of how leanness influences mortality. She mentioned that, in addition to osteoporosis, chronic obstructive lung disease and lung cancer are related to leanness, but it is likely that this association is due to the higher prevalence of smoking among the lean. Identifying the reasons for the weight loss, voluntary or involuntary, in many of the studies is difficult. The underlying disease process is most important, especially in older Americans.

Nancy Summer, Council on Size and Weight Discrimination, requested clarification of a statement from the Technology Assessment Conference on Methods for Voluntary Weight Loss and Control that indicated that a 10-percent reduction in weight had positive effects on health. Dr. Manson responded that weight loss can often improve insulin sensitivity and glucose tolerance. In very obese individuals, glucose intolerance also is influenced positively by small reductions in body weight, but the condition is not necessarily normalized.

Robert Garrison, NHLBI, made a final comment on the issue of obesity and the older population. He referred to a 1988 paper by Harris and colleagues (1988) on the Framingham Heart Study, published in the *Journal of the American Medical Association*, which showed a powerful positive relationship between weight and mortality in individuals over age 65, even after controlling for confounders (such as cigarette smoking).

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PANEL 2: STRATEGIES FOR OBESITY PREVENTION

The panel on strategies for obesity prevention explored current school-, family-, and community-based strategies for preventing obesity and suggested directions for future research and activities. Dr. Patricia J. Elmer, University of Minnesota, chair of the panel, introduced the topic. Dr. James F. Sallis, Jr., San Diego State University, examined what is known about the results of school-based obesity prevention programs and discussed related research issues and priorities for school activities. Dr. Leonard H. Epstein, University of Pittsburgh, focused on epidemiological studies of family-based obesity programs and emphasized the importance of family involvement as well as exercise in long-term weight control. Dr. Robert W. Jeffery, University of Minnesota, described results from four community-based obesity programs and stressed the relationship of public health and the prevalence of obesity in the community. The panel concluded with general discussion and comments by participants.

INTRODUCTION--Patricia J. Elmer, Ph.D., R.D.

Obesity is a problem with many dimensions and leads to difficult questions such as how people with obesity can best be reached and how the development of obesity can best be prevented. School- and clinic-based programs as well as populationwide interventions are needed, and program effectiveness needs to be analyzed. Different approaches to intervention are offered in school-based programs, family-based programs, and community-based programs. What are the advantages and disadvantages of these approaches?

Variables that have been used to identify key interventions include age and gender as well as ethnicity and geographic location. Additional insights into effective strategies for intervention may be provided in the differences between weight cycling and smoking cycling. Evidence suggests that individuals who quit smoking a number of times are more successful in ultimately stopping permanently; however, this is not true for individuals who lose weight a number of times. The reasons for this--that is,

the behavioral and psychological components of weight cycling--need to be investigated.

SCHOOL-BASED OBESITY PROGRAMS--James F. Sallis, Jr., Ph.D.

A large number of children can be reached in school-based obesity programs, especially younger children. Comprehensive treatment and prevention programs can be conducted on a daily basis for many years, and relevant professionals are usually available to help monitor the programs. School-based obesity programs offer multiple opportunities, most commonly for educational and behavioral modification interventions, through the physical education curriculum, the school lunch program, environmental changes, and summer school programs. Comprehensive school-based obesity programs also may include health education services for peer groups, families, and school staff. School-based programs are, however, only one component of the overall health promotion model, and they are limited in the services they can provide.

Treatment Programs

Ward and Bar-Or (1986) and Parcel and associates (1988) reviewed 10 studies of school-based obesity treatment programs. Elementary and secondary school students who were overweight were selected for participation in the programs. In general, treatment consisted mostly of educational components (covering diet, physical activity, and behavior modification), but other components involved modified physical activities and school lunches. Mean treatment length was 15 weeks. Treatment programs, reported in changes in percentage of overweight participants, were more successful in elementary school children (a 12-percent reduction) than in secondary school students (a 5-percent reduction). However, which components were related to the success of the programs, and why the younger children were more successful than the older children, could not be determined. The length of treatment was not related to outcome. In addition, most treatment studies included only a few key components (diet and physical activity education), made no provisions for modifying the environment, had little parental involvement, and demonstrated no long-term effects.

Prevention Programs

Obesity was one of the risk factors tracked in seven studies of school-based cardiovascular risk reduction programs (see table 1). Interventions in these programs lasted from 7 weeks to 5 years and included 4,000 primary school students (in three programs) and 3,400 secondary school students (in four programs). Intervention components included modified physical education classes as well as education about diet and about physical activity. Only one primary school included in the studies modified its school lunches; three secondary schools involved parents.

Table 1 shows the effects of school-based prevention programs. Of the seven programs, one in the primary grades (a physical education intervention) and two in the secondary grades had a significant effect on obesity. The table also illustrates that risk factors other than obesity (for example, blood pressure, lipids, smoking) tended to be influenced more significantly in all programs. However, none of the programs made much effort to combine education and environmental change. Most did not include either physical education and school lunch modification or involve parents, and they also did not emphasize behavioral skill training. Thus, they did not demonstrate the potential effectiveness of prevention programs for obesity that include most or all of the key components.

Table 1. School-Based Prevention Program Effects

In Primary Grades							
	Obesity	Blood Pressure	Lipids	Fitness	Smoking		
Bush et al., 1989	N	Y	Y	Y	Y		
Dwyer et al., 1983	Y		N	Y			
Walter et al., 1988	N	N	Y	N			
In Secondary Grades							
	Obesity	Blood Pressure	Lipids	Fitness	Smoking	Activity	Diet
Killen et al., 1988	Y				Y	Y	
Lionis et al., 1991	Y(BMI)	Y	Y				N
Puska et al., 1982	N	N	Y(F)		Y		Y
Tell and Vellar, 1987	N	Y(F)	Y	Y(M)			
Y = Yes, there was a treatment effect N = No effect BMI = Effect for body mass index; no effect for skinfolds M = Male participants only F = Female participants only							

Future studies of prevention need to address the implications of the modest changes in body fat in youth that these seven studies revealed as well as the effects of schoolwide prevention programs on obese youth. Because the number of school-based treatment programs appear to be decreasing while prevention programs are increasing, it may be time to put more emphasis on treatment programs. The best direction for intervention programs to take may be that demonstrated by the ongoing NHLBI Child

and Adolescent Trial for Cardiovascular Health Study. This trial includes educational and environmental components in addition to family involvement and may indicate the effects of a prevention approach on the development of obesity.

Key Research Issues

Among key issues in researching school-based obesity programs are the selection, recruitment, and retention of the population targeted for treatment; the long-term effects of treatment; the feasibility and effectiveness of program components; and the quality of implementation of the interventions. Other research issues that must be considered are the optimal timing and duration of the intervention, the effectiveness of integrating simultaneous treatment and prevention programs, monitoring the effectiveness of diet and physical activity, and appropriate interventions for ethnic groups. Important related issues are how to implement obesity prevention and treatment programs in the schools (particularly given the already limited resources) and how to determine the most effective settings (schools versus clinics) for these programs. In addition, explorations of the limits of intervention effectiveness need to be made because no program to date has included all the components required to ensure quality implementation. One of the most promising features of schools as intervention settings is the possibility of long-term programs, and the cumulative effects of both treatment and prevention strategies over several years need to be examined.

Priorities

The number one priority for school-based programs should be modifying the composition of school lunches and ensuring the active participation of students in physical education classes. Modifications to these existing programs are definitely needed to make them more effective for obesity prevention and treatment. Behavior modification components need to be built into programs related to diet and physical activity. Other priorities include conducting parent education and establishing treatment programs for obese children. In furthering priorities, the psychosocial effects of treatment need to be considered to ensure that psychosocial functioning is enhanced and that no child is stigmatized.

FAMILY-BASED OBESITY PROGRAMS--Leonard H. Epstein, Ph.D.

Data from recent studies emphasize the importance of family-based obesity programs (Epstein and Wing, 1987). Results of epidemiological studies suggest that children of obese parents have a greater risk of developing obesity in adulthood than children with lean parents (Charney et al., 1976; Garn and LaVelle, 1985). Thus, family-based obesity programs that expect both generations and all family members to participate actively and make behavior changes can have more of an impact. Family-

related variables--that is, factors common to multiple family members such as food storage, family environment, and behavior support--can be capitalized on and manipulated to produce family behavior changes.

Among the studies demonstrating the need for family-based obesity programs are four epidemiological studies (Abraham and Nordsieck, 1960; Abraham et al., 1971; Stark et al., 1981; Garn and LaVelle, 1985) that showed that obese older children are more likely to retain obesity in adulthood and that the relative risk is particularly high for children ages 10 to 12 (see table 2). These data suggest that, as children become older, they have a greater relative risk for becoming obese adults and provide a good indication of the ages when interventions are needed.

Table 2. Relative Risk by Age of Obese Children Who Become Obese Adults

Age of obese child	Percent who become obese adults	Relative risk
0-6 months	14	2.3
0.5-5.5 years	20	3.4
7 years	41	3.7
10-12 years	70	6.0

In a 10-state nutrition study, Garn and Clark (1976) analyzed the triceps skinfold measures of boys and girls as a function of parental weight. Children of two obese parents were found to have much more body fat than children of two lean parents, and an interaction between parents and children was demonstrated: that is, an obese child with obese parents has a different risk than an obese child with lean parents.

In another study, Charney and colleagues (1976) followed children with heavy or thin parents from age 6 months to adulthood. Results again suggested an interaction between parent and child and that treating obese children with obese parents was more important than treating obese children with lean parents. The percentage of children who became obese adults as a function of parental weight is shown in table 3.

Table 3. Percentage of Children Who Become Obese Adults as a Function of Parental Weight

	Percent with heavy parents	Percent with thin parents
Heavy children who become obese adults	51	20
Thin children who become obese adults	15	11

Four 10-Year Followup Epidemiological Studies

The four recent family-based 10-year treatment studies, one of which has been published (Epstein et al., 1990), involved children ages 6 to 12 years who were 20-percent overweight, in the 85th percentile of triceps skinfold, and had no psychiatric disorders. The children apparently had no reading disabilities (they had to keep food records). All had obese parents, except for the ones in whom the long-term effects of parental weight on child weight loss were being studied (Epstein et al., 1987). Treatments were once a week for 8 weeks and then once a month for 4 months. After 10 years of followup, the data showed that a significant number of children in the treatment programs maintained treatment effects, as compared to those children not in the treatment programs. As discussed below, these studies demonstrated the importance of active participation by all family members and of targeting family-related variables.

- **Study 1 (Epstein et al., 1990): Targeting children versus targeting children and parents**--This study compared results when the child alone was targeted for treatment versus when both the child and parent were targeted. A nonspecific control group (in which no particular family member was targeted) also was included. The study used the Cooper lifestyle exercise program and focused on habit and weight change behaviors. The results suggest that involving the parent as an active participant has a large effect on long-term change.
- **Study 2 (Epstein et al., 1984): Diet versus diet and lifestyle**--This study examined differences between emphasizing diet versus emphasizing diet and lifestyle modifications, including exercise. Parents were not included as active participants. This study showed no significant differences between the two interventions at the 10-year point.

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- **Study 3 (Epstein et al., 1987): Positive versus negative family history**--This study compared the effects of a positive family history (at least one heavy parent) with the effects of a negative family history (no heavy parents). Obese children performed more poorly with treatment when one parent was obese than when both parents were lean, even when the treatment was the same. Differences were noted at 1 year and maintained for 10 years.
 - **Study 4 (Epstein et al., 1985): Lifestyle versus aerobic exercise**--This study targeted both children and parents and compared the effects of a lifestyle exercise program (walking during daily activities), the effects of a more traditional aerobic exercise plan (a 2-mile run), and the effects of no exercise. The 10-year data showed long-term weight maintenance effects for both groups that exercised as compared to the group that did not exercise.

Personalized System of Instruction Study

A recent followup study of the treatment studies described above (Epstein et al., submitted [a]) was based on a competency-based education system called the Personalized System of Instruction (PSI). With the PSI, children learn at their own pace and must master basic skills before moving on to more complex skills. The study involved 6 months of weekly treatment and 6 months of maintenance meetings. A treatment effect (measured in percent over BMI change) appeared at 12 months in children and their parents but was not sustained at 2 years. This suggests that more personalized instruction is needed during the weight maintenance phase of the treatment program.

Obesity and Television Watching Studies

Research has investigated the correlation between prevalence of obesity and the number of hours spent watching television (Dietz and Gortmaker, 1985). Epstein and associates recently looked at whether decreasing sedentary activities--that is, cutting back on television viewing--had a positive effect on weight. Three treatment groups were included: diet plus increased exercise, diet plus decreased sedentary activity, and diet plus a combination of increased exercise and decreased sedentary activity. Reductions in primary sedentary behaviors (watching television) were reinforced to determine if decreasing the sedentary behavior would result in increased activity or in another sedentary behavior (such as reading a book). Treatment involved 4 months of weekly meetings and 2 months of maintenance. The diet plus decreased sedentary activity treatment showed the most powerful effect on percent overweight change--at both 6 months and 1 year (Epstein et al., submitted for publication [b]). The data suggest that children who received positive reinforcement in cutting back on sedentary behaviors and who were given a choice of behaviors were more likely to select and prefer active behaviors. The researchers suggest that children who are not given a

choice of activities will eventually select more active behaviors but not necessarily enjoy them.

Recommendations for Family-Based Obesity Programs

- Parents must have an active role in the treatment program.
- Exercise is the key to long-term weight control in all obesity programs.
- The family's environment and behaviors must be targeted.
- Specialized training in childhood behavior modification needs to be provided when treating the entire family.
- Obesity treatment programs with dietary changes do not affect a child's growth. The 10-year followup studies demonstrated that children who participated in treatment programs were within 2 centimeters of the height of their same-sex parent.
- Programs need to emphasize that preventing obesity also may prevent eating disorders and reduce cardiovascular risk factors.
- Further study of the psychosocial effects of obesity treatment programs in children is needed.

COMMUNITY-BASED OBESITY PROGRAMS--Robert W. Jeffery, Ph.D.

Obesity is primarily an adult-onset disorder. It is several times more common in middle-aged adults than in young adults, and by age 50, nearly half of all adults are 20 percent or more above desirable weight. Susceptibility to obesity is widespread; particularly at risk are minorities (especially African-American women) and young adults of lower socioeconomic status.

Obesity must be viewed as a community problem and intervention programs targeted appropriately. To affect public health, influencing the prevalence of obesity in the community is essential. To be successful, community intervention programs must:

- reach a large number of young adults, particularly those at highest risk;
- change eating and exercise habits that are related to obesity; and
- be available at a reasonable cost.

Progress in developing community-based programs is illustrated in four community intervention projects conducted by the University of Minnesota.

Healthy Worker Project

The first of these programs, the 1987-90 Healthy Worker Project (HWP), involved worksite health promotion (Jeffery et al., 1993). In this trial, 32 public and private worksites with a wide range of occupations were randomly assigned to a treatment group or a control group. The 16 worksites in the treatment group received free health promotion programs on weight control and smoking cessation. Onsite educational classes were offered four times over a 2-year period. A payroll incentive plan was used in which modest amounts of money were deducted from paychecks and returned contingent upon progress made toward the weight loss goal. About 20 percent of all employees participated in these classes (38 percent of overweight employees and 10 percent of normal-weight employees). Both weight loss and weight gain prevention were encouraged as a personal goal. The mean weight loss for HWP participants in weight loss classes averaged about 5 pounds over 6 months. The overall effect of the intervention on all employees was measured by changes in BMI. Average weight changes were small, and there were no differences between the 16 worksites in the treatment group and the 16 worksites in the control group.

Invest in Your Health Study

The second community intervention program was a weight loss and smoking cessation effort utilizing a direct mail and home correspondence strategy called Invest in Your Health (IYH) (Jeffery et al., 1990). Participants were recruited by mail and offered one of two programs: a \$5 fee-for-service program consisting of a self-help manual and monthly newsletters or a program identical in content but incorporating a \$60 incentive deposit that was fully refundable contingent upon reaching a weight loss goal. Weight loss goals were selected by the participants themselves, and weight gain prevention was encouraged as a program option. Evaluation was made through self-reported weights and heights using a return postcard. These reports were validated by actual measurement at baseline and 1-year followup in a subset of the sample. Responses were obtained from about 6 percent of households in the \$5 fee-for-service program and from 1 percent in the program incorporating the \$60 incentive deposit.

Individuals participating in both programs lost modest amounts of weight, with men losing more weight than women. Individuals participating in the incentive-deposit program lost twice as much weight as those participating in the fee-for-service program, but only one-fifth as many participated. Thus, the overall community impact should be larger with the fee-for-service program. IYH demonstrated that a correspondence program not only can reach a large number of people at a reasonable cost but also can produce modest weight losses of a magnitude useful for populationwide obesity prevention efforts.

Pound of Prevention Trial

The Pound of Prevention (POP) trial was a correspondence course that focused on studying weight gain prevention rather than weight loss (Forster et al., 1988). The participants--219 normal-weight volunteers--were recruited by mail and randomly assigned to a treatment program for preventing weight gain or to a control group. The volunteers were more likely to be women and nonsmokers. The POP trial utilized monthly newsletters, a minicourse on weight control, and a deposit incentive system (\$10 per month returned if no weight was gained). The POP trial also collaborated with a local health department to enhance generalizability to a community setting. The overall recruitment response rate was 13 percent.

Over 12 months, the treatment program group lost an average of 1 kilogram, but there was no weight change for the control group. In the treatment group, 82 percent did not gain weight compared to 56 percent in the control group. The differences were statistically significant. Characteristics of treatment group participants that correlated with weight loss were male gender, older age, nonsmoking, no prior experience in weight control, and higher participation in the program activities. The POP trial demonstrated that weight gain prevention programs can be implemented successfully in communities at relatively low cost.

Minnesota Heart Health Program

The Minnesota Heart Health Program (MHHP), a 10-year project, was designed to evaluate the effectiveness of multicomponent interventions in reducing cardiovascular disease incidence and mortality (Leupker et al., submitted). Three matched community pairs (approximately 500,000 total individuals) participated. Interventions over 7 years included risk factor screening, use of mass media and adult education, and activities at worksites, schools, and restaurants. Goals of the program included cholesterol reduction, smoking cessation, blood pressure reduction, increased physical activity, and weight control. MHHP results showed dramatic weight gains (as measured by BMI) throughout the program in all communities, both before and after the educational activities were in place. The MHHP thus had no communitywide impact on obesity.

Conclusions

Community-based programs can indeed reach large numbers of adults and interest them in weight gain prevention programs. Short-term effects on weight are small but positive. However, the effectiveness of community-based programs in reducing the prevalence of obesity in whole communities has not yet been demonstrated. Additional research in this area is needed to examine better recruitment efforts that can attract the large numbers of participants required to demonstrate a communitywide effect. None of the community-based programs

described here have demonstrated a true community effect. Additional studies of long-term effects are also needed.

GENERAL DISCUSSION

Dr. Eva Obarzanek, NHLBI Division of Epidemiology and Clinical Applications, asked whether environmental changes similar to those in schools for children have been implemented for adults. Dr. Jeffery suggested that such changes could be made via food labeling and marketing practices and that consumption of high-fat foods could be discouraged by adding an excise tax to foods based on their fat content and by regulating portion-size packaging. He argued that food manufacturers should not have unlimited marketing access to the public and that it is essential to educate the public so that people realize that the food supply is not entirely benign.

In response to a question about any characteristics of parents or household environments that improved study outcomes, Dr. Epstein stated that, over the short term, there is a very high correlation between parent weight changes and child weight changes. However, over 5 to 10 years, parents generally go back to their original weight, even while the child maintains the weight change. After 10 years, there are no longer any treatment effects for parents. Modeling does not appear to be in effect because the child does not model the parent's weight gain. Promising areas for research are the influence of parental support on a young child's developing eating habits, the influence of roommate support for exercise on young adults, the influence and number of televisions in the household, and food-storing practices in the household.

In response to a followup question concerning other parent or household characteristics affecting study outcomes (e.g., socioeconomic status and single parenthood), Dr. Epstein said that studies have not shown socioeconomic status to predict weight loss. Other characteristics that have an effect are the size of the family (children from large families do not do as well, particularly if older siblings are overweight) and the age of the child (older children ages 11 to 12 years do better than younger children ages 9 to 10 years).

Dr. Elmer commented on the roles of physical activity and cultural norms in weight loss. In her studies, 25 percent of adults at baseline reported doing no leisure physical activity. Those able to increase their physical activity the most were already active. Those who maintained their weight, or who lost the most weight, maintained the most change in their leisure physical activity, and this maintenance was related to a valuing of and a preference for physical activity that had been established at an early age. Thus, how the cultural norms relating to physical activity can be

influenced most effectively is an obvious concern in establishing any weight loss program.

Dr. JoAnn Manson, Brigham and Women's Hospital and Harvard Medical School, noted that one of the limitations of worksite programs is that they do not reach unemployed women who are at greatest risk of weight gain. She asked whether any of the community-based programs had compared efficacy in preventing weight gain among women employed outside the home versus among women at home and, furthermore, whether there were any interventions targeting women at home. Dr. Jeffery replied that he knew of no interventions targeted to this group but that it is an area for future research.

Dr. Elaine Stone, NHLBI, asked Dr. Epstein whether the issue of depression in children and parents had been studied. Dr. Epstein replied that the data are being reviewed and that the first 10-year followup showed a few children with psychological disorders, but that there was no untreated control group to use for comparison. However, the data that have been collected seem to show no greater prevalence of these conditions in obese children than in the general population.

Dr. Stone commented on a school-based study conducted in North Carolina, in which a nurse-delivered American Heart Association program was implemented. The program first used the classroom curriculum approach and then a high-risk individualized approach for obese children. The nurse delivering the program dropped the high-risk approach, however, after noting that the children might be stigmatized because they were being separated out of the classroom.

Dr. William Dietz, American Academy of Pediatrics, suggested that school lunch and television behaviors could be potentially valuable arenas for long-term interventions. Both overlap with other behaviors--school lunch with cholesterol and cancer prevention efforts, and television with prevention efforts aimed at alcohol consumption, violence, and aggression. Both are free of stigmatization because the focus is not on obesity.

Dr. Dietz asked the panel whether they saw any indications that programs such as theirs have an adverse impact on those who were not successful. Dr. Epstein responded that the literature suggested that obese children develop internal problems (depression) versus external problems (aggression, violence, substance abuse); however, this literature is vague and confusing. His studies show that depression in obese children was linked to parental depression rather than to obesity. Dr. Sallis responded that he had not found any study that examined the psychosocial effects of school-based programs and that a few correlation studies showed a poorer self-image in obese children, but that depression or more serious symptoms were not seen. The issue of stigmatization was not addressed in the studies he had reviewed, but this could be due to the fact that some of these studies were conducted after school.

William Fabrey, National Association To Advance Fat Acceptance, commented that treatment for children should not be stigmatizing and that sensitivity training is needed for individuals working with obese children. He added that payroll-based programs, as described by Dr. Jeffery, should be avoided because such programs may be a violation of human rights. Even if these programs are voluntary, too often participation is not really as voluntary as it may seem.

Karen VanLandegham, National School Health Education Coalition, Inc., commented to Dr. Sallis that because school-based prevention programs should encompass kindergarten through 12th grade, be ongoing, and be incorporated into other health education programs, political issues were involved in efforts to implement the programs. Dr. Sallis acknowledged the limitations in school budgets and their effects on starting new programs and gave an example of a school system with this situation. Demonstration of the effectiveness of these programs remains critical due to the various constraints on their implementation.

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PANEL 3: ISSUES IN EDUCATING THE PUBLIC ABOUT WEIGHT AND OBESITY

The third panel examined issues in educating the public about weight and obesity. Dr. Cheryl Ritenbaugh, University of Arizona, chair of the panel, introduced the topic, emphasizing factors and issues that affect the needed emphasis on exercise. Dr. Pauline Powers, University of South Florida, discussed nutrition in adolescents. Dr. Bonnie Spring, Chicago Medical School and Veterans Affairs Medical Center, described the relationship of smoking and weight gain. Dr. Arthur S. Leon, University of Minnesota, explored the role of physical activity in the prevention and management of obesity. Dr. Jeffery Sobal, Cornell University, reviewed the sociocultural and demographic issues of obesity. The panel concluded with general discussion and comments by attendees.

INTRODUCTION--Cheryl Ritenbaugh, Ph.D., M.P.H.

Cultural factors influence knowledge, attitudes, and behavior regarding food consumption and activity patterns and thus influence body shape and fatness. One way to gain perspective on cultural influences is to examine our language. "Hunger" expresses our desire to eat; "supermarket" indicates a place where we can find items for food intake. But our language has no analogous word for our desire to exercise and a place where we can find whatever we need for exercise. For example, there are no words to complete the analogies "Hunger is to eating as _____ is to exercising," and "Supermarket is to food intake as _____ is to exercise."

Our lack of language related to exercise, this cultural deficiency, has an effect on the first of four factors that affect obesity.

-
- Exercise availability
 - safety
 - resources/location
 - time
 - Food availability
 - time for preparation
 - knowledge
 - income
 - resources
 - physical availability
 - advertising and marketing of food
 - Knowledge and valuation of healthy lifestyles
 - education
 - experience
 - socioeconomic status
 - Physiology
 - energy balance
 - adipose tissue

Our culture currently places the greatest emphasis on the food intake side of the energy balance equation, with much more limited importance given to exercise. An evaluation of this cultural emphasis helps to make clear why no individual should be blamed when he or she has the knowledge to lose weight but does not act upon the knowledge. The cultural factors of language and what is emphasized must be considered in educating the public about weight and obesity.

NUTRITION IN ADOLESCENCE: OBESITY AND THE HAZARDS OF TREATMENT--Pauline Powers, M.D.

Adolescent eating behaviors are of great importance when considering educational messages to teenagers about body and weight. Adolescence is a time of growth; yet, paradoxically, widespread dieting occurs in this age group. Some data suggest that approximately 15 to 22 percent of adolescents are classified as obese (Laurier et al., 1992; Gortmacher et al., 1987), but 60 to 70 percent of teenage girls and 40 percent of teenage boys have dieted either to lose weight or to maintain weight (Hueneman et al., 1966; Dwyer et al., 1967; National Institutes of Health, 1992).

Dissatisfaction with size and shape is very high among adolescent girls; Moore (1988) reported that 67 percent of adolescent girls and young women were dissatisfied with their weight. Moses et al. (1989) found that fear of obesity was common among girls irrespective of weight: 51 percent of the underweight adolescent girls they studied described themselves as extremely fearful of being overweight, and 36 percent were preoccupied with body fat. Weight consciousness occurs even in young children. Maloney et al. (1989) found that 45 percent of children in grades 3 to 6 want to be thinner.

Obesity is defined as an excess of body fat, using a variety of standards. Most commonly, obesity has been defined using anthropometric measurements of height and weight. The common standards are the 1983 Metropolitan height-weight tables for adults or the results of the National Health Examination Survey (NHES) for children and adolescents. The Metropolitan height-weight tables list desirable weight ranges for height using three different frame sizes. Overweight has been defined as 10 percent above desirable weight and obesity defined as 20 percent above desirable weight. The NHES tables define the 50th percentile as the desirable weight, and obesity is defined as a certain percentage (typically 20 percent) above the desirable weight.

Various body mass indices also have been used including the currently popular body mass index (BMI). The National Center for Health Statistics (NCHS) defines overweight as the sex-specific 85th percentile of body mass index in men and women ages 20 to 29 years. These measures of overweight are indices of obesity as none of them are based on measures of body fat.

Underwater weighing (hydrostatic weighing) is the classic standard for determining lean body mass and fat content, but measurements of total body water, total body potassium, and dual energy x-ray absorptiometry are techniques that have certain advantages (Powers, 1994d). The classic study differentiating overweight and overfat was written by Welhelin and Behnke (1942) in which they studied football players: the athletes were overweight according to height-weight tables but were actually underfat using underwater weighing. Abraham and colleagues (1982) examined a group of ballet dancers who were normal weight using the Metropolitan height-weight tables but exhibited high muscle content, low fat content, and amenorrhea.

Hoerr and colleagues (1992) illustrated the problems with the NHES tables used for childhood and adolescent weight (table 1). Two groups of adolescent girls (10 African-American females and 16 white females) classified as obese were studied using underwater weighing, the NHES tables, and the Slaughter equation (Slaughter et al., 1988). Using the standard of underwater weighing, these girls were an average of only 15.1 percent above desirable fat content; however, using the NHES tables, they were classified as an average of 37.7 percent above desirable weight. In this

study, BMI also incorrectly classified these teenage girls as more obese than did the underwater weighing technique or the skinfold technique using the Slaughter equation.

Table 1. Percentage of Goal Weights for Obese Adolescent Girls Assessed by Three Methods

	African-American	White	Total
NHES tables*	150.6% ($\pm 34.5\%$)	129.6% ($\pm 15.9\%$)	137.7% ($\pm 26.2\%$)
Slaughter equation†	116.4% ($\pm 13.5\%$)	109.3% ($\pm 10.4\%$)	112.0% ($\pm 12.0\%$)
Underwater weighing‡	117.9% ($\pm 15.5\%$)	113.4% ($\pm 9.4\%$)	115.1% ($\pm 12.0\%$)

Source: Adapted from Hoerr et al., 1992.

*NHES growth charts = [Actual weight/desirable weight at 50th percentile from NHES] $\times 100$.

†Slaughter equation = (Fat-free weight from % fat/0.75, assuming 25% fat as desirable) $\times 100$ (Slaughter et al., 1988).

‡Underwater weighing = (Fat-free weight from underwater weighing/0.75, assuming 25% fat as desirable) $\times 100$.

Other studies show BMI to be problematic even in patients who are in the normal weight range. Boyd (1992) studied normal-weight adolescents with bulimia and anorexia nervosa, using skinfold measurements (four-site method described by Durnin and Womersley, 1974), BMI, and physiological assessment. Normal BMI did not necessarily mean that body composition was normal. For example, an 18-year-old female 5' 4-1/2" in height weighing 120 pounds had a BMI of 20.1 (i.e., weight was in the desirable range using the Metropolitan height-weight tables and BMI was in the desirable range); however, this patient with chronic anorexia nervosa had multiple signs, symptoms, and laboratory findings indicating semistarvation including depletion of total body potassium (using a whole body counter), cerebral atrophy, and osteopenia.

More accurate measurements of fat content are available than BMI, including underwater weighing and dual energy x-ray absorptiometry (DEXA), but these methods are more difficult to implement or have radiation risks (Lukaski, 1987). Skinfold measures (e.g., triceps, biceps, subscapular, suprailiac) and age-appropriate nomograms (e.g., those designed by Durnin and Womersley, 1974) may be reasonable alternatives.

The average fat content is 18 to 20 percent for young adult males and 25 to 30 percent for young adult females (American Alliance for Health, Physical Education, Recreation, and Dance, 1984; Slaughter et al., 1988). Frisch and Revelle (1969)

noted that average fat content at menarche was 24 percent. Frisch and McArthur (1974) proposed a fat-content theory of menses and fertility and provided evidence that the minimum amount of body fat necessary for menarche is 17 percent and for fertility 22 percent. Frisch also has posited that both relative and absolute fat content are important in maintenance of normal reproductive cycles (Frisch 1988; Frisch 1990). In their study of patients with anorexia nervosa who had regained menses, Meyer and colleagues (1986) provided tentative support for the theory that 17-percent fat content is required for menses.

Although fat content increases with age, usually in the visceral compartment, very little is known about the expected and safe fat content with increasing age. For adolescents, if fat content is maintained into adulthood, fat content of 25 percent for adolescent boys and 30 percent for adolescent girls may be the baseline above which complications (such as elevated blood pressure and hyperinsulinemia) are likely to occur (Williams et al., 1992; Lew et al., 1979). This fat content probably corresponds to greater than 120 to 130 percent of the desirable weights using the Metropolitan height-weight tables or the NHES tables.

Risks of Adolescent Obesity

Adolescent obesity is associated with both physiological and psychological risks. Physiological risks have been well documented (Lauer et al., 1975; Aristimuno et al., 1984; Becque et al., 1988) and include:

- increased blood pressure;
- increased total cholesterol and abnormal lipoprotein ratios; and
- hyperinsulinemia.

Psychological risks include:

- poor body image, which is "imprinted" in adolescence (Stunkard and Burt, 1967);
- low self-esteem, including fear of obesity and increasing preoccupation with size and shape (Maloney et al., 1989); and
- cultural stigmatization. Children and adults devalue overweight children even more than children with other disabilities (Richardson et al., 1961; Harrison and Smith, 1982; Maddox et al., 1968).

Certain physiological and psychological factors may predispose obese adolescents to adult obesity, and their risk of becoming obese is high. However, not

all obese adolescents become obese adults. Abraham and Nordsieck (1960) reevaluated 120 10- to 13-year-olds in adulthood and found that 86 percent of overweight boys were overweight adults compared to 42 percent of normal-weight adolescent boys. Clarke and Lauer (1993) found that nearly 70 percent of obese children became obese adults.

Rees (1990) has summarized the factors that may facilitate the maintenance of adolescent obesity into adulthood. These include genetic predisposition (Bouchard, 1989); less sodium pump activity, which decreases energy usage, making more fat available for storage (Ng et al., 1989); defects in temperature regulation (Contaldo et al., 1986); more active lipoprotein lipase (Smolin et al., 1987); hyperinsulinemia, which tends to maintain the obese state (Caballero, 1987; Danforth, 1983); less thermogenesis (Acheson et al., 1984); adipocyte hypertrophy and hyperplasia (Sjostrom, 1980); sex differences in body fat distribution (Freid and Kral, 1987); and set point (Keesey, 1988). Changes in body composition resulting from dieting also may facilitate maintenance of adolescent obesity into adulthood (Keys et al., 1950; Liebel and Hirsch, 1984; Garner and Wooley, 1991).

Psychological factors that may contribute to the maintenance of obesity in adulthood include disturbances in body image, low self-esteem, and stigmatization. These factors may make weight loss harder. For example, an obese person may be too embarrassed to exercise in public.

These powerful physiological and psychological factors increase the likelihood that obesity in adolescence will be maintained into adulthood.

Effectiveness of Obesity Treatment

The results of obesity treatment in adolescents have not been impressive. Garner and Wooley (1991) have summarized the studies documenting the failure of dietary programs to produce significant maintained weight losses. Bjorvell and Rossner (1985) found that the mean weight loss at 6 months was 26 kg, but decreasing to 8.7 kg at 4 years. Kramer and colleagues (1989) found that less than 3 percent of subjects were at or below posttreatment weight on all followup visits. Other researchers have documented similar findings (Graham et al., 1983; Stalanos et al., 1984). With respect to obesity treatment in adolescents, Rees (1990) reported that 85 to 95 percent of patients regain at least as much weight as they lost and Stalanas and colleagues (1984) found evidence that patients regain even more weight than the initial weight lost. Literature on restrained eating by chronic dieters shows that dieting may result in increased weight; restrained eaters generally weigh more and have higher maximum weights following childhood (Laessle et al., 1989; Tuschl, 1990), report eating less (Wardle and Beales, 1987), and expend about 620 kcal less per day than those with an unrestrained (nondietering) eating style (Tuschl et al., 1990). In addition, some studies report a tendency for energy to be redeposited preferentially

as body fat when food intake is normalized after a period of food restriction (Garner and Wooley, 1991; Dulloo and Girardier, 1990; Ozelci et al., 1978).

Hazards of Dietary Treatment of Obesity

Dieting in obese adolescents is associated with a wide variety of physiological and psychological hazards.

Physiological Hazards

The physiological hazards of dietary treatment of obesity in adolescents include changes in body composition, yo-yo dieting, and binge eating.

Changes in body composition. Changes in body composition often result from decreased basal metabolic rate, decreased lean body mass, and increased fat content. Several researchers have documented the reduction in basal metabolic rate with calorie restriction (Elliot et al., 1989; Leibel and Hirsch, 1984; Keys et al., 1950). The few patients who are able to maintain lower weights do so not by normalizing eating patterns but by continuing to restrict calories (Leibel and Hirsch, 1984). Trembley and colleagues (1984) studied a group of men who maintained a weight loss of 40 kg through a running program; however, these men still tended to maintain high fat contents compared to never-obese runners of similar weight. Most patients who diet regain the weight they have lost, and there is a tendency to restore this gained weight as fat. Garner and Wooley (1991) have summarized the data indicating that weight cycling (weight loss and weight regain) results in higher weights than before dieting. Lean body mass decreases during prolonged dieting (Abraham and Wynn, 1987).

Yo-yo dieting. Repeated cycles of weight loss and weight gain may be associated with significant health risks. Hamm and colleagues (1989) have shown that the risk of death due to cardiovascular disease is twice as high for a gain-and-loss group compared to a weight-gain-only group.

Binge eating. The development of binge eating may be related to the treatment of obesity: chronic dieters have marked episodes of overeating that resemble binge eating (Garner, 1985; Polivy and Herman, 1985), and a subgroup of obese patients meet formal criteria for the binge eating disorder (American Psychiatric Association, 1993), the development of which may be related to chronic dieting (Marcus and Wing, 1987). Excessive dieting associated with being obese may lead to binge eating, which in turn leads to increased obesity (Telch et al., 1988).

Psychological Hazards

There are psychological hazards associated with dietary treatment of obesity as well. Smollar et al. (1987) found that clinically significant weight loss was associated with risk of adverse mood changes. This parallels the finding by Stunkard and Rush (1974), who reported "dieting depression." Although dieting depression has not been studied systematically, repeated failure at maintaining weight loss is likely to be associated with significant loss of self-esteem in obese individuals who have dieted.

Hazards of Dieting in Nonobese Adolescents

Because at least half of the adolescents who are dieting are not overweight, the implications of dieting in the nonobese population must be considered. Many teenagers who are at or below normal weight consider themselves overweight and therefore may be prone to respond to any national initiative to lose weight by dieting.

Physiological Hazards

The physiological hazards of dieting include development of semistarvation, decreased or inadequate deposition of bone mineral stores, and delayed menarche or amenorrhea.

Weight loss in normal or underweight adolescents can result in semistarvation, which has well-known physiological complications (Powers, 1990; 1994b). These complications include:

- gastrointestinal changes such as delayed gastric emptying and increased liver enzymes;
- cardiac changes such as arrhythmias, electrocardiogram changes, and decreased cardiac performance;
- endocrine findings, including "sick" euthyroid syndrome, low luteinizing hormone, low follicle stimulating hormone, and low estradiol;
- hematologic changes such as anemia; and
- brain complications, including cerebral atrophy, enlarged ventricles, and electroencephalogram abnormalities.

Failure to gain weight during the growth spurt may result in short stature or delayed menarche (Powers and Root, 1987). Patients who develop amenorrhea during

weight loss may have to gain back more weight than they lost when amenorrhea began (Frisch, 1988).

Adolescent girls with anorexia nervosa who have periods of significant weight loss as brief as 1 year are prone to develop osteopenia, or decreased or inadequate bone stores (Bachrach et al., 1990). Furthermore, even if menses occur, anovulatory cycles (which may be associated with decreased fat content) are associated with decreased bone mineral stores (Prior et al., 1990).

Psychological Hazards

Psychological problems commonly develop during dieting, and the risk of developing an eating disorder is particularly high during adolescence when dieting behavior is rampant.

Keys and colleagues (1950) found that a group of 36 psychologically normal males who were placed on about half their normal caloric intake--what is now considered a conservative treatment for obesity (Stunkard, 1987)--developed significant emotional and behavioral changes during weight loss (see also Garner et al., 1985).

Adolescent dieters experience increased incidence of anorexia nervosa, bulimia nervosa, and the binge eating disorder. (Foreyt, 1987; Garner, 1985; Keys, 1986; Wooley and Wooley, 1984). Both obese and lean dieters eat more when depressed than nondieters (Baucom and Aiken, 1981; Polivy and Herman, 1985).

Food restriction is associated with a variety of physiological and psychological complications in both obese and nonobese groups. Because many nonobese teenagers perceive themselves as overweight, caution must be exercised to ensure that interventions intended for the obese are not also implemented by the nonobese.

Treatment Strategies

Treatment of obese adolescents should be based on two underlying principles: (1) "do no harm," and (2) "if it ain't broke, don't fix it." Because the preponderance of evidence indicates that caloric restriction is ineffective and possibly harmful, dieting should not be recommended. Current treatment methods are unlikely to result in significant weight loss in the majority of obese adolescents. However, several recommendations are likely to improve the physiological and psychological health of obese adolescents.

- Decrease dietary fat and increase complex carbohydrates.

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- Aim toward normal nutritional intake without restriction below usual calories needed for age and height.
 - Improve physical fitness to reverse some of the metabolic consequences of obesity--e.g., exercise improves sensitivity to insulin even without weight loss (Rees, 1990).
 - Provide psychosocial support and take steps to prevent low self-esteem or body image disturbances.

Public Education Goals

Goals for public education programs targeted to and for adolescents need to emphasize public acceptance of a range of normal body sizes and shapes. They also must recognize that the physiological and psychological hazards of dieting outweigh the possible benefits. Food restriction decreases basal metabolic rate, decreases lean body mass, and, with the almost inevitable regaining of weight, may increase total fat content compared to the period before dieting.

SMOKING AND WEIGHT--Bonnie Spring, Ph.D.

Smoking is the largest preventable cause of death and disease. One of every six deaths is caused by smoking. That is, each year 390,000 deaths in the United States--from cardiovascular disease, cancer, and chronic obstructive lung disease--result from smoking (U.S. Public Health Service, 1988). Data indicate that 27 percent of U.S. adults smoke (U.S. Public Health Service, 1990), even though 93 percent believe smoking harms health and 70 percent wish to quit smoking (U.S. Public Health Service, 1990). There is a 50-percent reduction in probability of death (over 15 years) for a person who quits smoking at age 50 (Kawachi et al., 1993; LaCroix et al., 1991; U.S. Public Health Service, 1990).

Barriers to quitting smoking, according to current young adult smokers, include gaining weight (57.9 percent of women, 26.3 percent of men), feeling tense and irritable (67.7 percent of women, 62.1 percent of men), and enjoying smoking (50.9 percent of women, 50.4 percent of men) (Pirie et al., 1991). The U.S. tobacco industry capitalizes on women's fear of weight gain, spending an average of more than \$10 per person, or \$3.3 billion annually, on advertising (*Morbidity and Mortality Weekly Report*, 1990; Warner et al., 1992).

Weight Gain and Smoking Cessation

Evidence suggests that smoking suppresses body weight. In 31 of 41 studies, or 76 percent, those who begin smoking lose weight, and smokers who quit smoking

gain weight (Klesges et al., 1989). Average weight gain after smoking cessation is 8.4 pounds in females and 6.2 pounds in males (Williamson et al., 1991). Approximately 10 percent of males and 13 percent of females experience a major weight gain, defined as more than 28 pounds, after quitting smoking.

Some predictors of major weight gain after quitting smoking in both sexes appear to include:

- African-American heritage;
- age under 55 years; and
- smoking more than 15 cigarettes per day.

For females, being underweight and sedentary further contribute to a postcessation weight gain (Williamson et al., 1991). Potential mechanisms linking smoking and weight gain are physical activity, metabolism, and food intake. Longitudinal studies examining the effects of smoking cessation on acute changes in dietary intake--both inpatient (Gilbert and Pope, 1982; Hatsukami et al., 1984; Leischow and Stitzer, 1991; Spring et al., 1991) and outpatient (Hall et al., 1989; Perkins et al., 1990; Stamford et al., 1986)--show an increase in consumption of 179 to 383 calories per day.

In general, those who are successful at smoking cessation gain more weight than those who are not successful. Underweight individuals gain more weight than those who are overweight. Studies exploring the relationship between weight concern and smoking relapse reveal the following.

- Ex-smokers are 10 times less likely than current smokers to endorse weight loss as important (Klesges et al., 1988b).
- Never-quitters are almost five times more likely than attempters to say that weight control is the most important life quality factor (Klesges et al., 1988b).
- For both males and females, lack of expectation that quitting will cause weight gain predicts cessation and abstinence at a 6-month followup (Klesges et al., 1988a).
- Nonrelapsers have less concern about weight than do relapsers, and concern tends to decrease even as they are gaining weight (Streater et al., 1989).

Therefore, appropriate goals for public messages regarding smoking and body weight are to minimize excessive weight concern, educate about the small magnitude of smoking's weight-suppressing effect, and educate about the relative health risks of

smoking versus the weight gain associated with cessation. The target audience of these messages should be adolescent females and adult women. Candidates for weight gain prevention include the already obese, those at risk for major weight gain, and highly weight-conscious individuals.

Weight Gain Prevention Strategies

Interventions to prevent weight gain after smoking cessation should aim at enhancing (or at least not undercutting) cessation, decreasing energy intake (particularly of sweet and high-fat foods), and preventing reduced energy expenditure or compensating for increased energy intake by increasing energy expenditure. Enhancing tolerance of weight gain is necessary if a basic incompatibility exists between weight maintenance and smoking cessation.

Strategies to prevent postcessation weight gain include caloric restriction and pharmacological agents. Effective strategies and agents enhance abstinence; ineffective strategies and agents undercut abstinence.

Caloric Restriction. Dieting while quitting smoking seems to promote a relapse to smoking. As a study by Hall and colleagues (1992) has suggested, possible mechanisms may include treatment complexity and increases in the reinforcing efficacy of nicotine produced by food deprivation. In the study, which examined relapse and weight gain prevention, participants who had completed a 2-week smoking cessation program (involving seven 1.5-hour sessions) were randomly put into three groups for 6 weeks.

- **The control group** held no meetings until week 6.
- **The innovative group** weighed each participant each morning. If 2 pounds were gained, an individualized calorie reduction plan was implemented. Each participant also had an individualized exercise plan. Behavioral self-management was emphasized. This group met twice a week for weeks 1 through 3 and weekly for weeks 4 through 6.
- **The nonspecific group** aimed to prevent weight gain. Educational presentations were made, and group discussions about nutrition, exercise, and eating were held. This group, like the innovative intervention group, met twice a week for weeks 1 through 3 and weekly for weeks 4 through 6.

More individuals stayed abstinent from smoking in the control group at week 6 (57 percent) than in both other groups (50 percent in the innovative group, 41 percent in the nonspecific group), and this continued to week 52 (35 percent in the control group, 21 percent in the innovative group, 22 percent in the nonspecific group).

A possible reason for such failures of behavioral weight control interventions during smoking cessation is an attitudinal bias in the weight intervention groups with the subjects placing more importance on weight than cessation. As already noted, another reason may be treatment complexity. Yet another may be biological incompatibility between maintaining cessation and restricting dietary intake because sweets and carbohydrates offer an alternative source of reward and may have a beneficial effect on withdrawal symptoms.

Pharmacological Agents. Among pharmacological agents for quitting smoking are nicotine gum, which may or may not prevent weight gain, and the nicotine patch, which has not been tested adequately. Serotonergic agents (d-fenfluramine, fluoxetine) and phenylpropanolamine prevent weight gain. Concerns in the use of these pharmacological agents include side effects, potential tolerance to weight-maintaining effects, and regaining weight after discontinuing the drug.

Conclusions

- Nicotine has a small weight-suppressing effect.
- Women are especially responsive to the weight control benefits of smoking.
- For most people, the weight gain after smoking cessation poses trivial health risks in comparison with the risks posed by smoking.
- Weight gain prevention efforts may be indicated for the already obese, for those at risk for major weight gain, and for highly weight-conscious individuals who would not otherwise attempt smoking cessation.
- Attempts to diet and quit smoking simultaneously appear contraindicated because they seem to promote the risk of smoking relapse.
- Pharmacologic approaches to weight gain prevention may hold promise; however, both their side effects and duration of benefit warrant careful consideration.
- Attitudinal modifications about postcessation weight gain may be most important in preventing relapse to smoking.

THE ROLE OF PHYSICAL ACTIVITY IN THE PREVENTION AND MANAGEMENT OF OBESITY--Arthur S. Leon, M.D.

Since 1900, the prevalence of obesity per 100,000 individuals has doubled, despite a mean decrease of 10 percent in energy intake. The increase in obesity can

be attributed to a decrease in physical activity. Decreases in physical activity often lead to obesity, just as obesity often leads to decreases in physical activity (Pi-Sunyer, 1988).

The dynamics of energy balance between caloric input and exercise output are essential considerations in weight management. When there is more input of food energy than output of energy from resting metabolic rate, physical activity, and the thermic effect of food, the balance is positive and weight (fat) is gained. A positive energy balance of 100 kcal per day means that over 1 year the caloric energy intake surplus amounts to 36,500 kcal, and the expected gain in body weight (fat) is 10.4 pounds per year (0.90 pounds per month). However, when energy output is greater, the balance is negative and weight is lost. A modest negative energy balance of 200 kcal per day (100 kcal from reduced food intake and 100 kcal from increased energy expenditure from, for example, walking or jogging 1 mile per day) means that the energy deficit over 1 year is 73,000 kcal, and the predicted weight loss is 20.8 pounds (1.7 pounds per month).

The adverse effects of very-low-calorie diets on the body are additional reasons to consider increasing physical activity as an aid for weight control. If the balance becomes too negative (e.g., -1,000 kcal per day) as the result of such diets, adverse effects can include ketosis; dehydration and electrolyte disturbances; elevated uric acid; body composition changes (losses of body water, bone mass, lean body mass); myocardial atrophy (which may result in congestive heart failure or sudden death); psychological changes (apathy); reduced physical activity; weight plateauing; rapid rebound weight gain upon refeeding; and a "rhythm method of girth control."

Another reason for using exercise in a weight management program is that obesity, especially abdominal obesity, is a risk factor for atherosclerotic cardiovascular disease that can be favorably impacted by endurance exercise. Other risk factors favorably impacted by exercise include blood pressure; blood lipids and lipoproteins (raising HDL, lowering triglycerides); glucose-insulin dynamics (improved cell insulin sensitivity); and hemostatic factors (lowering blood fibrinogen levels and platelet aggregation--and thus the risk of thrombosis--and raising tissue plasminogen activator so as to maintain fibrinolysis or dissolve clots) (Leon, 1991).

Regular aerobic exercise also may provide psychological benefits. These include improved perceived self-control, self-confidence, and self-image; feelings of well-being; improved stress tolerance; muscle-relaxant and tranquilizing effects; reduced mental depression; and possibly positive changes of detrimental health habits (Leon, 1989).

Several metabolic mechanisms produce the favorable effects of physical activity on weight control. In addition to the increased energy expenditure during physical activity, the resting metabolic rate postexercise is increased for 40 to 90

minutes. The thermic (heat-producing) response to food is also increased (Leon, 1989). The favorable effects on body composition include enhanced fat mobilization, especially in the abdominal region; an increase in or preservation of lean body mass; and increased bone mass. Better appetite control is a possibility because of temporary appetite suppression following exercise and a failure to compensate for energy output by increased food intake.

Such favorable metabolic effects were demonstrated in a study of six obese young men undergoing a 16-week walking program (Leon et al., 1979). The men exercised by walking on a treadmill for 90 minutes, five times a week, over 16 weeks. Overall, they decreased their body weight by 12.5 pounds. They also lost approximately 25 percent of their body fat, reducing their fat weight from 23 to 17 percent, while slightly increasing their lean body mass. Other favorable outcomes included reduced heart rate and blood pressure and improved glucose tolerance.

Increased physical activity and improved fitness also contribute to improved quality of life, particularly during aging (Voorrips et al., 1993). In addition to psychological benefits and subjective feelings of health and fitness, maximum oxygen consumption increases and thus cardiorespiratory endurance; muscle mass and bone density also increase and thus strength; and motor performance, reaction time, flexibility, and balance are improved.

Treatment Strategies

Strategies to promote physical activity for weight maintenance and treatment of obesity include making a conscious effort to increase physical activity throughout the daily routine and giving a high priority to setting aside permanently a block of time specifically for exercising at least three to five times a week (Leon, 1989). Safe types of exercise for obese individuals include both weight-bearing activities (walking, stair climbing, simulated skiing and cross-country skiing, low-impact calisthenics and aerobics) and non-weight-bearing activities (swimming, bicycling and stationary cycling, circuit-weight training). Weight-bearing activities use more energy per unit of time than non-weight-bearing activities. However, obese individuals should avoid running, jumping, or vigorous calisthenics at the onset of a fitness regimen.

Particularly helpful for many obese people is circuit-weight training, one of the non-weight-bearing activities. Circuit-weight training is a series of different weight-lifting exercises performed in a preestablished exercise-rest sequence (McArdle and Toner, 1988). Weights are lifted at 30 to 40 percent of peak strength (that is, maximum weight that one can lift once). There are usually 8 to 12 stations per circuit, 15 to 22 repetitions every 30 seconds per station, and 15-second rest intervals between stations. Each circuit-weight training session provides 20 to 30 minutes of exercise, and the total energy cost per session for a 200-pound person is 360 kcal per 30 minutes (which is equivalent to jogging at a 5-miles-per-hour rate). Bonuses of

circuit-weight training are increases in skeletal muscle mass/strength and resting metabolic rate.

Guidelines for safe aerobic exercise (Leon, 1989; McArdle and Toner, 1988) include the following:

- **Medical screening or clearance**--Those over age 40, particularly those with other risk factors for coronary heart disease, should obtain a medical screening or clearance. A graded exercise test should be included.
- **Warmup and cool-down**--Sessions should begin and end with 5 to 10 minutes of light aerobic/flexibility activities.
- **Frequency**--Aerobic exercise should be performed at least three to five times per week.
- **Duration**--Sessions should begin with 10 to 15 minutes of aerobic activities and progress to 30 to 60 minutes per session. The goal should be energy expenditure of at least 300 kcal per session.
- **Intensity**--Maximum oxygen consumption should be 40 to 80 percent, which is equivalent to about 60 to 90 percent of maximum heart rate.

To reduce the risk of coronary heart disease, 30 to 60 minutes of low- to moderate-intensity physical activity per day, plus 1 hour of moderate to vigorous exercise per week, appears to be optimal. Furthermore, a goal should be for men to maintain their maximal aerobic capacity at the 10 MET level and for women at the 9 MET level.

Both the general population and obese individuals have reported barriers to regular exercise (Leon, 1989). Among these are perceived lack of time, willpower, and self-discipline; lack or inaccessibility of facilities; and fear of associated injury. Additional barriers reported by obese individuals include discomfort, boredom, and embarrassment.

Suggestions for weaving more physical activity into daily routines are to:

- move around more at work, in the home, and for transportation;
- take the stairs instead of using elevators (energy cost for a 200-pound person walking upstairs is 23 kcal per minute, downstairs 9 kcal per minute);

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- walk at least part of the way to work, and park at a distance while shopping (energy cost for a 200-pound person walking 1 mile in 20 minutes is 106 kcal);
 - be more active around the house, yard, and garage;
 - choose active recreational pursuits (dancing, bowling) in place of sedentary ones (watching television);
 - do desk exercises;
 - stand as much as possible instead of sitting; and
 - take walking breaks every hour and in place of--or for at least part of--coffee and lunch breaks.

Conclusion

Recent interest in physical activity for weight management has markedly increased. Two reasons are the adverse effects of very-low-energy diets in management of obesity and the failures in maintaining weight losses from dieting. Other reasons include the favorable metabolic effects of increased physical activity on energy balance, weight control, and body composition; the improvements in the quality of life, particularly during aging; and the reduced risks for cardiovascular disease because of both reverses in the metabolic and physiologic risk factors associated with obesity as well as its independent effect on cardiovascular risk (Leon, 1989).

SOCIOCULTURAL ASPECTS OF OBESITY--Jeffery Sobal, Ph.D., M.P.H.

Sociocultural factors may be the most important influences on the prevalence of obesity (Sobal and Stunkard, 1989; Sobal, 1991c; Sobal et al., 1992). Social patterns, social explanations, and social consequences of obesity are important to consider. From a public health standpoint, the intended outcome of implementing a national education program on weight and obesity is to decrease the prevalence of obesity, not necessarily to treat it. Viewing obesity in the larger context of social and cultural values provides much insight into the underlying factors influencing obesity.

Social Patterns of Obesity

Using a social epidemiology approach, the following demographic patterns of obesity emerge.

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- **Age**--Obesity increases with age, until it begins to decline in the elderly.
 - **Sex**--Females are more likely to be obese than males.
 - **Race**--Caucasians are less likely to be obese than other races.
 - **Parity**--Parous women are more likely to be obese than nulliparous women.
 - **Socioeconomic status**--Lower-status women are more likely to be obese than middle- or upper-status women and all men.
 - **Marital status**--Married men are more likely to be obese than unmarried men.

A social epidemiology approach is often employed to identify target groups, develop screening strategies, and tailor interventions to various audiences. One risk of applying this social epidemiology approach, however, is the tendency to place blame on the obese person. An epidemiological approach may stigmatize obese individuals for factors over which they may have little control. But when these same variables are viewed from a social science approach, the emphasis is placed on the sociocultural aspects of obesity rather than on demographic, biological, or physiological characteristics. Using a social science approach, the following social patterns of obesity emerge:

- **Life-cycle stage (age)**
 - role timing and duration
- **Gender (sex)**
 - social norms and social power
- **Ethnicity (race)**
 - subcultural values and beliefs
- **Socioeconomic status**
 - education
 - knowledge and beliefs
 - income
 - resource access
 - occupation
 - lifestyle

- **Marital status**

- obligations and social support

- **Parenthood**

- role demands

By reconceptualizing the variables into social and cultural factors, a different perspective can be gleaned about factors related to obesity that possibly may be influenced or changed.

Social Explanations of Obesity

From a broad-scale perspective, culture is one of the primary influences on predictors of fatness and obesity. In traditional societies, fatness is valued; in developed societies, thinness is valued. A quantitative cross-cultural study by Brown and Konner (1987) showed that 81 percent of traditional cultures valued fatness as the ideal in feminine beauty. Brink (1989) has shown that fatness enhances a woman's marriageability in many cultures. Social development--that is, helping societies change their value systems about thinness, exercise, and low-fat diets--may be the intervention goal.

From a social science perspective, a whole range of nested factors can be investigated about obesity. These include:

- **Immediate causes**

- motivation, behaviors, skills

- **Underlying causes**

- knowledge, attitudes, norms

- **Basic causes**

- roles, relationships, social structure

- **Ultimate causes**

- values, resources, power

Changing the prevalence of obesity means changing society at one or more of these levels.

Weight and Obesity Interventions

Theories about the causes of obesity are important because they guide assessments and interventions. Implicit theories and assumed theories may mislead program planners because different theories suggest very different programs and interventions. The three main interventions for obesity are education, resources, and proper environment. Education interventions can provide information, skills, and values. Resource interventions can supply services, support, and finances. Environmental interventions require adequate access and availability of resources.

Interventions may focus on obesity, health behaviors, and environmental changes. Interventions that focus on obesity itself emphasize the symptom and not the underlying causes. Such obesity-focused interventions mix voluntary (environmental) with involuntary (genetic) causes, which is inappropriate because individuals are unable to change their genetic makeup. Furthermore, health and appearance motivations are combined, which can lead to some negative health effects. Hayes and Ross (1987) showed that most people are concerned about obesity and overweight because of their effect on appearance and not for health reasons.

Interventions focusing on health behaviors can avoid some but not all of the psychological and social harm to obese people by emphasizing the positive benefits of voluntary actions. Health behavior interventions also may help to prevent other health problems.

Interventions focusing on environmental modifications avoid individual blame and stigmatization, provide benefits to everyone, and combine prevention and treatment.

Social Consequences of Obesity

In our society, the psychological consequences of obesity include a concern and anxiety about weight that may coincide with "dieting depression," low self-esteem, negative self-image, and hopelessness. Negative social consequences of obesity include stereotyping, prejudice, stigmatization, social isolation, and discrimination. Such discrimination can affect opportunities in education, employment, promotion, earnings, housing, marriage, and group membership.

The following list shows a four-component model (Sobal, 1991b) developed for coping with the negative social consequences of obesity. The components include recognition, readiness, reaction, and repair.

1. Recognition

- Development of awareness that obesity is stigmatizing
- Gaining of insight, information, and understanding about stigma

2. Readiness

- Anticipation of settings and people involved in stigmatization
- Preparation for stigmatizing acts
- Prevention of stigmatization by information/exposure control

3. Reaction

- Immediate coping with stigmatizing acts
- Longer-term coping with stigmatizing acts

4. Repair

- Repair of problems from stigmatizing acts
- Recovery from problems resulting from stigmatization
- Restitution and compensation for stigmatization
- Reform of stigmatizing actions and values of others

Conclusion

The principles of biomedical ethics (Beauchamp and Childress, 1989; Sobal, 1991a)--autonomy (self-determination), beneficence (helping), nonmaleficence (avoiding harm), and justice (fairness)--must be kept in mind when dealing with the problem of obesity. Applying a social perspective to the stigma of obesity can restructure the issue by showing that the problem is not only a physical issue based on the stigmatizing characteristic but also a social problem that can be addressed using insights and interventions from sociology.

GENERAL DISCUSSION

Dr. William Dietz, American Academy of Pediatrics, commented on Dr. Powers' emphasis on the risks of dieting in adolescents versus the benefits, stating that little support exists for the position that dieting has negative effects in normal-weight individuals. He also stated that a modest calorie reduction does not induce semistarvation in adolescents. Dr. Sobal responded that reducing fat rather than calories in the diet should be the focus in establishing healthy eating habits. He suggested that the name of the initiative be changed to reflect an emphasis on healthy eating and exercise habits rather than on obesity and weight. Dr. Ritenbaugh observed

that in her research with adolescent girls, the word "fat" is sometimes used to invoke social support. That is, when girls say to their friends that they are fat what they are really looking for is acceptance and support and for their friends to tell them that they are not fat.

Dr. Robert Jeffery, University of Minnesota, agreed with Dr. Dietz, stating that the hazards of dieting are a controversial issue. He also disagreed with Dr. Powers' statement that there are no health benefits to dieting for normal and slightly overweight people and noted that upper-middle-class women who typically "watch what they eat" are the healthiest of all populations in the United States.

Dr. Peter Wood, Stanford University, stated that physical activity should be stressed to adolescent girls, particularly the ones who are dieting, and that physical activity and a healthy lifestyle should serve as cornerstones of the NHLBI OEI. He also stated that encouraging physical activity may help combat the weight gain after smoking cessation.

Nancy Summer, Council on Size and Weight Discrimination, stated that fat people generally have a lack of trust of doctors' advice on the health risks of obesity. She recommended minimizing the obesity prevention message and, instead, concentrating on the benefits of healthy eating and the joys of physical activity. She also suggested eliminating competition in school sports programs.

Dr. Dietz suggested keeping the terms "physical fitness" and "exercise" separate and clearly defined because the two terms represent different energy costs.

Dr. Sue Kimm, University of Pittsburgh School of Medicine, stated that information is still needed on childhood obesity and prevention. She recommended providing continuing medical education to physicians on childhood obesity.

Dr. Susan Yanovski, National Institute of Diabetes and Digestive and Kidney Diseases, echoed Dr. Kimm's comments on the need for educating physicians about obesity, adding that physicians too often feel that obesity is a moral weakness.

Dr. Patricia Elmer, University of Minnesota, noted that physical activity is not valued in many cultures except for an elite group of athletes. She stated that not only do workers employed in manual types of labor seldom spend their leisure time engaged in physical activity, but also the normal leisure time activity for our society is "taking it easy."

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PANEL 4: COMMUNICATION STRATEGIES FOR EDUCATING THE PUBLIC

The fourth panel focused on communication strategies for educating the public. John McGrath, chief, Communications and Marketing, NHLBI, and chair of the panel, provided a brief overview of how target audience identification and segmentation fit into the NHLBI's information campaign strategies. Dr. Janice E. Williams, Stanford Center for Research in Disease Prevention, used the Stanford Five-City Project to illustrate the social marketing principle of audience segmentation as a strategy for targeting adults. Dr. Thomas N. Robinson, Stanford Center for Research in Disease Prevention, supported the use of a population-based approach to intervention rather than a selective high-risk approach in communication strategies for targeting children and adolescents.

INTRODUCTION AND OVERVIEW--John McGrath

In setting the stage for the presentations on communication strategies, background was provided about NHLBI communication activities in three broad areas:

- the role of communication strategies in NHLBI communication programs;
- the environment in which health messages are developed and disseminated; and
- the publics that NHLBI programs seek to reach.

Communication Strategy

One of the early activities that the NHLBI undertakes as part of an education program or initiative is the development of a communication strategy. Typically, the strategy:

- summarizes the health issue and the scope of the problem;

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- identifies primary and secondary target audiences;
 - develops possible messages for the audiences (messages should be tested with the target audiences before full development); and
 - identifies appropriate channels for the messages.

The communication strategy document is reviewed by all major stakeholders in a field and provides a focus for the communication activities of all those stakeholders.

Environment for Health Messages

Health messages for publics and patients developed at the NHLBI are created within an environment accustomed to applying a scientific process to solving problems. For example, when a community of researchers identifies a problem, they typically design an experiment to test various interventions and move toward consensus on which intervention is most efficacious for which group of people. In some instances, surgery may be required to correct a condition; in other instances, a pharmacological agent may help manage a condition; and for some conditions, research has shown that lifestyle modification can control or prevent a condition.

Within this environment, it is tempting to view mass media as an intervention that can help prevent or manage a condition. If mass media could be applied as such an intervention, a fairly simple mass media health model could be constructed.

- Health professionals have information that can prevent or control a condition.
- Health professionals could package the information in a clever way and get it to the people at risk or who have a certain condition (i.e., use mass media to intervene).
- People at risk would use the information to avoid or control the condition.

Fortunately, both human behavior and the mass media are more complex. And as several of the following presentations point out, mass media may not be the single intervention that can help people control or manage a condition, yet mass media can play a crucial role in raising awareness and in placing an issue on the public agenda.

Publics

Several of the communications strategies developed for other NHLBI national education programs use the terms "population strategy" and "high-risk strategy." The population strategy targets an entire population with a message such as "have your blood pressure checked" or "eat less saturated fat and cholesterol to lower your risk

of heart disease." The high-risk strategy targets individuals at particularly high risk of suffering the consequences of a disease with a message such as "If you have high blood pressure, stay on your treatment, watch your weight, and cut your salt."

Yet if one strategy for an entire population is adopted, it should be recognized that not everyone in the population will respond to that strategy in the same way. In reality, as product marketing has demonstrated, there is no one "general public" but rather a variety of publics that respond quite differently to different messages. So a major challenge of the NHLBI OEI will be to segment the publics in a way that makes sense from a programmatic and economic point of view.

AUDIENCE SEGMENTATION AS A STRATEGY FOR TARGETING

ADULTS--Janice E. Williams, Ph.D.

Social marketing strategies are being applied increasingly to public health interventions (Manoff, 1985). The underlying guiding philosophy of social marketing is similar to that of its derivative--commercial marketing; that is, to increase the likelihood of the occurrence of an intended outcome in a campaign, planners need to develop their offerings from the perspective of the consumer (Lefebvre and Flora, 1988). As for public health, this philosophy implies that campaign planners would be well served by employing strategies that increase their understanding of their target audience and by developing programs that derive from those insights.

Audience segmentation is the social marketing strategy most directly concerned with understanding target audiences (Slater and Flora, 1991). This procedure partitions a large, undifferentiated group into smaller homogeneous and mutually exclusive subgroups. Segmentation analyses may be based on a number of attributes, including demographics, values and lifestyles, channels of communication, attitudes, preferences, and so on (Weinstein, 1987; SRI International, no date). Ideally, segmentation variables bear either a theoretical or an empirical relationship to the outcome behavior. Data gathering and subgroup classification can be carried out using either qualitative and quantitative methods. Qualitative methods (e.g., focus groups, indepth interviews) provide many details about the target audience. Quantitative methods (e.g., surveys) provide fewer details but more structure.

The following is an example of audience segmentation by weight success in which the three main steps in a segmentation analysis were illustrated. Data were derived from the Stanford Five-City Project--a long-term health information campaign conducted in northern California (Farquhar et al., 1985a).

Segmentation by Weight Success

A cohort of men and women ages 25 to 55 years was selected from the Five-City Project data set and differentiated by weight success. Both pregnant women and individuals whose physical activity had been restricted for medical reasons were excluded. Weight success was defined in one of three ways:

- normal body weight at year 1 and at year 5 (for males, normal weight was defined as a BMI less than or equal to 26.4; for females, it was a BMI less than or equal to 25.8);
- overweight at year 1 and achievement of normal weight by year 5 (for males, overweight was defined as a BMI greater than or equal to 26.4; for females, it was a BMI greater than or equal to 25.8); and
- overweight at year 1 and loss of a minimum of 2 BMI units by year 5.

Segmentation Through Signal Detection

The first step in the analytic process was to establish mutually exclusive, homogeneous subgroups. The sample was stratified by gender assuming that men and women have different pathways to weight success. The segmentation task was approached quantitatively, using signal detection, a form of recursive partitioning (Kraemer, 1992).

Five sets of segmentation variables were considered:

- behavioral (vigorous and nonvigorous exercise, dietary and smoking habits);
- cognitive (awareness of diet and exercise CVD prevention strategies, health knowledge, exercise and diet self-efficacy);
- attitudinal (behavioral intention, weight and nutrition attitudes);
- communication (television, newspapers, radio, magazines, health articles, pamphlets, interpersonal discussion); and
- experimental condition (treatment versus control city).

Demographic variables were excluded to provide the psychosocial variables maximum potential for discriminating subgroups.

Signal detection analysis resulted in six audience subgroups for the males. Four model variables were significant in determining those groups: behavioral

intention, exercise self-efficacy, nutrition attitudes, and change in diet self-efficacy. The attitudinal and cognitive variables drove weight success for men; experimental condition was not a predictor of weight success.

The male subgroups were characterized as follows:

- Subgroup 1
 - Low-moderate behavioral intention
 - Low-moderate exercise self-efficacy
- Subgroup 2
 - Low behavioral intention
 - Absolute exercise self-efficacy
- Subgroup 3
 - High behavioral intention
 - Low-moderate exercise self-efficacy
 - Negative attitudes toward nutritious foods
- Subgroup 4
 - High behavioral intention
 - Low-moderate exercise self-efficacy
 - Positive attitudes toward nutritious foods
- Subgroup 5
 - High behavioral intention
 - High exercise self-efficacy
 - Decrease in diet self-efficacy
- Subgroup 6
 - High behavioral intention
 - High exercise self-efficacy
 - No change or an increase in diet self-efficacy over time.

Signal detection analysis resulted in five female subgroups. Three model variables were significant: weight attitudes, days of reading the newspaper, and health knowledge. When compared to the males, there were gender differences in the

variables controlling weight success; again, experimental condition was not a significant predictor.

The female groups were characterized as follows:

- Subgroup 1
 - Lowest control over eating behavior and weight
- Subgroup 2
 - High control over eating behavior and weight
 - No days of reading the newspaper
- Subgroup 3
 - Moderate control over eating behavior and weight
 - One or more days of reading the newspaper
 - Lower health knowledge
- Subgroup 4
 - Moderate control over eating behavior and weight
 - One or more days of reading the newspaper
 - Higher health knowledge
- Subgroup 5
 - Highest control over eating behavior and weight
 - One or more days of reading the newspaper

The next step in the analysis was to conduct a more refined analysis of the subgroups by examining differences among them on demographic, behavioral, cognitive, attitudinal, and communication variables. The third step was to outline campaign strategies based on the unique attributes of each subgroup. (These analyses for the female subgroups are still in progress.) For example, male subgroup 1, a high-risk group, was one of the more highly educated groups, was the second oldest, had relatively high income, was mostly married, and read the newspaper. Subgroup 1 members possessed many of the attributes that were likely to predispose them to healthy weight regulation, yet they were not exercising, their dietary habits were not particularly good, and they had a very low intention to lose weight. The channels, messages, and behavioral change strategies determined most likely to be effective in reaching subgroup 1 were as follows.

- **Channels**

- Newspaper supplemented by television

- **Messages**

- Increase exercise
 - Increase positive dietary habits
 - Increase exercise self-efficacy
 - Increase diet self-efficacy
 - Increase intention to lose weight

- **Strategies**

- Modify perceived risk for illness
 - Increase awareness of diet and exercise CVD prevention strategies
 - Increase awareness of excess weight
 - Modify subjective norms
 - Change attitudes toward men needing to lose weight
 - Skill building
 - Persuasive arguments
 - Modeling
 - Behavioral rehearsal
 - Reinforcement

A more successful male subgroup, subgroup 6, had the highest educational level, was youngest, had good incomes, tended to be married (although percentage of marrieds was lowest as compared to their peers), and made liberal use of print media and the radio. This subgroup also had the second highest level of exercise, not particularly good diet habits, not much awareness of diet and exercise as CVD prevention strategies, highest health knowledge, high exercise self-efficacy, moderate diet self-efficacy, and high intention to lose weight. The channels, messages, and behavioral change strategies determined most likely to be effective for this subgroup were as follows:

- **Channels**

- Newspapers and magazines supplemented by radio

- **Messages**

- Maintain exercise
 - Increase positive dietary habits
 - Maintain health knowledge

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- Maintain exercise self-efficacy
 - Increase diet self-efficacy
 - Maintain intention to lose weight

■ **Strategies**

- Skill building
- Persuasive arguments
- Modeling
- Behavior rehearsal
- Reinforcement

Conclusion

This audience analysis resulted in subgroups that were statistically different from one another. Campaign planners could decide to target each segment or collapse subgroups on the basis of their similarity to one another (e.g., the basis of their risk in relation to the outcome variable). For example, planners may want to target the high-risk subgroups rather than the most successful subgroups.

Audience segmentation can be a very useful tool for helping planners to know and decide upon target audiences. This kind of analysis provides a basis both for formative research with the targeted subgroups and for pretesting proposed messages.

COMMUNICATION STRATEGIES FOR TARGETING CHILDREN AND ADOLESCENTS--Thomas N. Robinson, M.D., M.P.H.

A number of features of obesity among children and adolescents make the design of a national obesity education program particularly difficult. One of the major obstacles is identifying a truly high-risk group. Four main factors account for this. First, physical morbidity is unusual in obese children and adolescents. Although being overweight certainly puts children and adolescents at a higher risk of hypertension, hypercholesterolemia, diabetes, and other health problems, the truth is that the great majority of obese children have none of these problems. Second, most obese children or adolescents do *not* become obese adults, and most obese adults were *not* obese children (Stark et al., 1981; Garn, 1985). In addition, childhood risk factors for clinically significant obesity, persistent obesity, or adult-onset obesity are only weakly predictive. In other words, we are really unable to predict, with any reasonable accuracy, which overweight children will have associated health problems or remain obese into adulthood, and which normal-weight children will grow into overweight adults. Similarly, we are unable to identify those most likely to benefit from treatment. As a result of these four factors, our current ability to identify truly high-risk individuals is quite limited. These uncertainties suggest that for public

education, a population-based approach is more appropriate than a selective high-risk approach, and any high-risk targeting should be limited to educational components directed at health professionals.

In medicine, the decision to treat is often made because of the belief that the potential benefits outweigh the potential risks. The principle of nonmaleficence suggests that we must "first, do no harm." However, in the case of obesity, significant side effects have been associated with both medically supervised and unsupervised weight control treatment. These side effects can include labeling the child, growth failure, delayed puberty, and significant psychological problems (Mallick, 1983; Stunkard and Rush, 1974). In addition, stigmatization and discrimination are very real for overweight children and adolescents (Brownell and Wadden, 1984). As a result, in many ways, obesity is much more of a social problem than a true medical problem for children and adolescents. Medical legitimization of these attitudes and practices can be particularly harmful. The NHLBI OEI must be extremely sensitive to these risks.

A desire for thinness is already pervasive in American culture. Some evidence suggests that dieting itself is causally linked with bulimia (Polivy and Herman, 1985). Young girls appear to be particularly vulnerable to adopting unhealthy weight regulation strategies in response to social pressures for thinness. For example, in an ethnically diverse population in northern California, research showed that by 10th grade (or about age 15), one-third of normal weight girls judged themselves to be overweight or very overweight, 10 percent of girls reported all the major diagnostic symptoms of bulimia, and an additional 10 percent reported purging for weight control (Killen et al., 1986, 1987). Thus the words "obesity," "overweight," or even "weight control" (and their themes) should be used only cautiously in this initiative. If possible, consideration should be given to change the title of the education initiative. The goal instead should be a campaign promoting healthful nutrition and physical activity, with only secondary emphasis on weight.

The principle of nonmaleficence has a companion, the principle of beneficence. The Food and Drug Administration has linked the two by following a policy of not allowing release of new products to the public until they are proven to be both "safe *and* effective." However, the criterion of effectiveness is often given less importance (or ignored entirely) in the planning and distribution of nonpharmaceutical interventions by Government, voluntary, and private-sector organizations. Clearly, the standard of proven effectiveness should be followed in public education campaigns such as that being planned by the OEI.

Formative Research and Evaluation

Including a prominent evaluation component in all interventions is the only way to ensure effectiveness. This evaluation should not only include outcomes but

also be a crucial part of campaign planning, development, and implementation, and it should include audience segmentation studies and needs analysis, pretesting of specific messages and educational strategies, timely feedback during implementation, and making improvements throughout the process.

Without performing an evaluation, we cannot be confident that our campaign is working and that it has no detrimental effects. Unfortunately, it is not uncommon to find that well-meaning programs produce no effects, or even detrimental effects. This has been particularly true for alcohol and other drug abuse prevention efforts.

The first stages of evaluation for a public education campaign involve audience segmentation and needs analysis, followed by pretesting. Age, sex, ethnicity, geography, and many other factors affect obesity, the physical and psychosocial effects of obesity, and nutrition- and activity-related knowledge, attitudes, and behaviors. To implement an effective campaign, these differences must be understood and acknowledged in the specific objectives and educational strategies. In the business world, a company would never think of launching a new product without devoting considerable resources to this kind of evaluation. This preparatory evaluation, called formative research, is how we get to know our target audiences. Later stages of evaluation involve process and effects (i.e., knowledge, attitudes, behaviors, physiology).

Targeting Multiple Levels and Using Complementary Strategies

Planning an education campaign should consider matching up the intended target groups (or audiences) with specific objectives (which eventually get translated into specific messages) and appropriate educational strategies (or channels of communication). All this needs to be guided by the results of formative evaluation. Evidence from previous attempts to change health behaviors with population-based interventions suggests that success is more likely if multiple levels of social organization--individuals, organizations, and communities--are targeted. On the individual level, specific objectives and strategies should be designed for children and adolescents themselves, and parents and health professionals (with specific targeting of pediatricians, family physicians, nurses, and nutritionists). Teachers and coaches also might be included. On the organizational level, specific objectives and strategies involving schools, community centers, health care facilities, restaurants, and supermarkets should be designed. On the community level, specific objectives and strategies involving neighborhoods, cities, counties, states, and the entire Nation should be designed.

In addition to targeting multiple audiences at multiple levels of organization, the most successful campaigns have used multiple, complementary educational strategies. Educational strategies can involve electronic media (noninteractive, interactive), print media (newspapers, books, magazines, pamphlets, newsletters,

posters, direct mail), and face-to-face interaction (formal--workshops, classes, counseling--and informal). They also can be environmental (healthy foods, recreational facilities) and regulatory (laws, policies). Not all educational strategies are appropriate for every specific audience, objective, or message. In planning this initiative, attempts should be made to use as many complementary strategies as possible.

Mass Media Strategies. A particularly popular belief is that mass media, and television in particular, are the source of--and answer to--all our health and social ills. This belief may arise from the assumption that because television reaches a large number of people, it therefore must have large effects. In reality, there are very few examples of effective mass media interventions. The Stanford Three-Community Study is one of the few available examples of mass media alone producing short-term health behavior change, although not in increased physical activity or sustained weight loss (Farquhar et al., 1985b). The Stanford Three-Community Study and a number of subsequent studies in Finland and the United States have demonstrated that when associated with more intensive interpersonal and environmental interventions, television can be effective in legitimizing a message and increasing awareness, directing viewers to resources (like a hotline number) or places to act (like a physician's office), or providing a reminder to act (Farquhar et al., 1991).

Although the mass media marketing model may be appealing, selling physical activity is very different from, for example, selling athletic shoes. Nike ads may appear to be promoting physical activity, but their main goal is to sell shoes. "Just Do It" does not refer to becoming physically active but to hustling down to the nearest, most convenient Nike dealer to purchase a pair of shoes. The process is simple, specified, and well understood, and the obstacle of spending money can even be deferred by using a credit card. There are very few barriers to overcome. The situation for physical activity is far from similar. Even if children and adolescents are persuaded to become more physically active, they need the physical resources to do it and the willingness to overcome, for example, the breathlessness and cramps in their sides. This is unlikely when only about half of the Nation's 9th through 12th graders are even enrolled in physical education (Centers for Disease Control, 1992).

Television is most suited to quick-fix solutions, but there is no quick fix for obesity. In addition, some interesting--and disappointing--findings come from research on advertising influences. For example, in controlled studies, ads for high-fat, high-calorie snacks *do* appear to influence the subsequent snack choices of children, but ads promoting healthful snack choices *do not* (Jeffrey et al., 1982; Gorn and Goldberg, 1982). Thus, if our purpose is to produce a significant long-term impact (and not just to pat ourselves on the back for a highly attractive campaign), the limits of television, and the benefits of other strategies, must be acknowledged.

Potentially beneficial strategies may utilize other noninteractive electronic media such as radio, recorded music, and films. Some researchers believe that music media have been underutilized in health campaigns for adolescents. By mid- to late adolescence, listening to music consumes about as much time as television viewing. Unfortunately, there is little information on the effects of health messages in music media, and some studies suggest that teenagers often completely miss the point of most songs or music videos with messages (Christenson and Roberts, 1990).

Technology also provides us with more interactive electronic media. Computers and computer games are particularly attractive media for producing personalized, interactive programs to guide behavior change in children and adolescents. The research group at Stanford University has had very promising preliminary results using interactive computer-based curricula.

Print Media. Use of the print media may include newspapers, books, magazines, pamphlets, newsletters, posters, and direct mail. Unfortunately, experience suggests that the written word does not seem to have tremendous persuasive appeal to most children and adolescents. This seems to be particularly true among the hip-hop generation (MEE Productions, 1992). However, the Stanford University studies have found print materials to be useful in association with more intensive, face-to-face interventions (Killen et al., 1988).

Face-to-Face Strategies. Face-to-face interventions include workshops, classes, counseling, and even formal medical treatment. In addition, informal conversations between friends may be an important focus, particularly for teenagers who are vulnerable to the perceived expectations of their peers.

Environmental Strategies. Environmental interventions may include changing the school lunch, replacing candy machines with fruit machines, rearranging cereal shelf plans in supermarkets, building bike paths and basketball courts, and making public parks safe. Regulatory strategies may include requirements for daily physical education classes in kindergarten through grade 12 or insurance incentives for adopting healthful behaviors. Unfortunately, research on the relative effectiveness of each of these strategies is limited, particularly for children and adolescents. The most important thing here is to match the specific objective, audience, channel, and message and, overall, to integrate multiple, complementary strategies.

School-Based Strategies. The Stanford group has had success with multiple-factor school-based interventions. The interventions, derived principally from Bandura's social cognitive theory and McGuire's social inoculation theory, mix face-to-face activities with print media, slides, music, and videos in the classroom. It is believed that an appropriate application of theory is directly related to success in achieving beneficial behavioral and physiologic outcomes (Killen and Robinson, 1988).

The largest of the Stanford University studies was a randomized, controlled evaluation in four ethnically diverse schools with a total of 1,447 10th-grade students (Killen et al., 1988). A 20-session intervention emphasizing skills training for nutrition, physical activity, cigarette smoking cessation, and stress reduction was developed. At a 2-month followup, a significantly higher proportion of those students who were exposed to the curriculum had become regular vigorous exercisers and reported beneficial changes in their food choices, as compared to an untreated control group. These results were substantiated by beneficial changes in resting heart rate, BMI, and triceps and subscapular skinfold thicknesses. Beneficial effects also were demonstrated for cessation of experimental cigarette smoking. In addition, at a 2-year followup, the significant differential effects were maintained for self-reports of vigorous physical activity, food choices, and smoking, as well as for measured resting heart rate, although not for BMI or skinfold thicknesses. These results suggest that it might be feasible to influence dietary, physical activity, and smoking behaviors beneficially for a large segment of the population through a school-based approach.

Summary

- A population-based approach is preferable to a high-risk approach.
- First, do no harm. Nutrition and physical activity should be emphasized rather than obesity or weight.
- All interventions need to be both safe *and* effective. Evaluation should be emphasized from start to finish.
- Formative evaluation should be used to match audiences, channels (or educational strategies), and specific messages. Knowing the target audience and how members will respond to the messages is essential.
- This initiative should attempt to integrate multiple complementary educational strategies.

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SMALL GROUP REPORTS

For the purpose of discussion, five potential target audiences--children, adolescents, adults, older adults, and minority populations--were identified. Each small group was assigned one of these target audiences and asked to consider:

- the target audience in terms of age, education, socioeconomic status, etc., with consideration to knowledge, attitudes, and behaviors related to weight, overweight, eating patterns, and physical activity;
- the content of appropriate messages related to weight, overweight, eating patterns, and physical activity for each target audience as well as the relationship of overweight to cardiovascular risk and lung disease;
- the issues of source credibility in the delivery of messages to the appropriate target audience as it relates to motivating the audience to action;
- the different strategies for motivating the target audience to act on the information--strategies such as fear arousal, positive reinforcement, and self-image enhancement; and
- the communication channels that could be used to deliver the various messages--channels such as interpersonal contact, mass media, and print materials.

SMALL GROUP REPORT: CHILDREN

Common Terms and Assumptions

The facilitator of the small group, Dr. Leonard Epstein, reviewed some of the science base and generally accepted assumptions related to obesity among children to lay a common foundation and provide a framework for discussion. The following items were listed.

- Definitions of obesity include:
 - 20-percent overweight;
 - 85th or 90th percentile BMI; and
 - 25-percent body fat for males and 30 percent for females.
- (No single definition was chosen.)
- Obesity among children is increasing.
- There is a higher rate of obesity in girls than boys.
- The prevalence of obesity increases at about 8 or 9 years of age.
- Obesity in children is related to cardiovascular risk factors such as lipids and blood pressure.
- The etiology of obesity among children is multifactorial and not well understood.
- Preventing obesity in children, unlike adults, involves two approaches. Should we prevent children from becoming overweight or prevent overweight children from becoming overweight adults? (The group did not resolve this question.)
- There are side effects to treating children for obesity, including development of eating disorders. For example, in the Catchment Area Study, 3 to 4 percent of those treated (mostly girls) developed eating disorders. Dieting, which may be a risk factor for eating disorders, is another side effect. Therapists can dispel or exacerbate the feelings of stigmatization in obese children.
- The preference for sweets is inherent from birth and difficult to work against.

Target Audience Overview

The target populations of children can be broadly defined as:

- **All children under age 12.** With a population-based approach and for primary prevention, messages should be tailored to the developmental stage of the child:
 - Infant
 - Preschooler
 - School-age
- **High-risk children under age 12.** With a high-risk approach and for secondary prevention, those specifically at risk of becoming obese adults should be targeted:
 - Obese children (the group did not agree on a definition)
 - Children with obese parents or siblings or with several cardiovascular risk factors

Priority Targets

The group was concerned that if the NHLBI Obesity Education Initiative targets only children at high risk, there will probably be increases in chronic dieting and eating disorders associated with dieting, as well as stigmatization of obese children. Thus, all children were identified as priority targets. Other priority targets are those who can influence children, including parents and families, physicians, teachers, child care providers, and food manufacturers. The group felt that primary prevention and a population-based approach will be most effective.

Although the small group identified the two major target audiences as all children and high-risk children, they focused entirely on the target audience of all children and the population-based approach. Developing similar messages, motivational strategies, and channels for high-risk children also will be an important activity for the group on high-risk children.

Content of Appropriate Messages

The group identified two major messages and related specific messages for children, parents, and others who influence them.

1. *Be more active.* (There was no consensus on specific caloric expenditure guidelines due to the lack of scientific data.)

■ For children

- Spend more time outside.
- Play outside with a friend.
- If you can't go outside, dance.
- Be physically active every day.
- Like your body, and take care of it.

■ For parents

- Be more active with your child, and be a model for your child.
- Support active, daily physical education in schools.
- Use community resources, such as schools, YMCAs, and parks, and transport your child to them, if necessary.
- Provide supplies and equipment for fun and activities, making sure all equipment is in good condition.
- Encourage less sedentary behavior, perhaps by limiting access to television and video games. Provide active choices, for example, by transporting your child so he or she can play in team sports.

■ For other influential people

- Support good physical education in schools, and ensure that it is not affected by school budgets.
- Assign homework in physical education classes.
- Encourage less competitive, more participatory sports for children.
- Train teachers and other influential people not to stigmatize obese children.
- Help children develop motor skills (jumping, throwing a ball) at appropriate ages so that they can enjoy physical activity throughout their lives. The National Association for Sport and Physical Education is working with KinderCare, a national chain of daycare centers, to develop guidelines.

2. *Eat less fat, and eat healthier.* The group focused on reducing fat rather than calories. They made no specific recommendations on the level of fat intake due to the lack of research and the fact that fat requirements vary with different developmental stages. The group made the following recommendations.

■ For children

- It's cool to eat fruit.
- Try a new fruit or vegetable every week.

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- Use fruit as snacks.
 - Choose a lean "happy meal."
 - Choose healthy, low-fat school lunches.
 - Choose low-fat snacks and desserts.
 - Be helpful to other children who are trying to make changes.

■ For parents

- Promote social skills that encourage healthy eating.
- Keep and prepare healthy foods. Do not keep high-fat foods like ice cream at home.
- Teach preplanning and problemsolving to your child at home and when eating out.
- Involve your child in food choices.
- Reward your child with praise and attention, not food.
- Be a good role model for your child.
- Encourage healthy school lunches and healthy choices from vending machines.
- Switch to low-fat milk and dairy products for children over age 2.
- Buy substitutes for high-fat foods.
- Bake and broil foods instead of frying. (Prepare all foods in low-fat ways.)
- Make meals a pleasant family experience.
- Modify your family's favorite recipes to make them low in fat.
- Pay attention to portion control.
- Try a new low-fat food or recipe every week.
- Teach your child how to prepare low-fat snacks.
- Keep food stored away, out of sight.
- Eat only in selected places in the home.
- Try skipping desserts.

■ For other influential people

- Conduct demonstrations in school cafeterias of how to make low-fat foods.
- Change the media environment so that healthy foods are marketed.

A participant relayed some of the issues and concerns brought up by Dr. David Levitsky, Cornell University, regarding messages on obesity. He has conducted food intake studies in which he changed the fat content of young adults' diets and found that the subjects who were blinded to the fat content of their diet did not completely compensate for the lower fat. They did, in fact, consume fewer calories. This research has led him to these conclusions.

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- Lowering dietary fat and increasing energy expenditure are the only ways to produce long-term changes in body weight. The major thrust in controlling body weight should be on changing dietary composition, that is, lowering dietary fat to less than 25 percent of calories, not reducing total caloric intake.
 - Middle- to upper-class females are already so sensitized to the effects of obesity that they are suffering from eating disorders.
 - Educational programs should teach weight acceptance. Any educational effort that encourages weight loss beyond 15 to 20 percent of total weight, except in the morbidly obese, should be discouraged.

The group discussed the above and questioned whether recommending dietary fat levels of less than 25 percent would be appropriate for children.

Source Credibility

The group did not discuss source credibility.

Motivational Strategies

The following strategies were briefly discussed by the group.

- Providing education, not just information
- Encouraging skill development for putting behaviors into action
- Making environmental changes

The group noted that many of the environmental changes in the messages focus more on diet than on physical activity. Other environmental change strategies, such as building sidewalks and setting up clubs and church groups, could encourage more physical activity. However, when children go outside, it is essential that the environment be safe and that the children have something active to do.

The group also suggested that all efforts stress the advantage--and importance--of encouraging youngsters to engage in physical activities that will be carried over into adulthood, such as tennis or running.

Channels for Communication

Although messages to the various segments of the target audiences will be similar, the channels to reach them may be quite different. Therefore, segmentation may occur by income level or gender so that various channels can be used.

Any person or organization, such as child care providers or civic associations that have an influence on children at any developmental stage, can be a channel for communication. The group identified these appropriate and effective channels.

- Parents and other influential adults--through magazines and churches
- Schools--through health education curricula, afterschool activities, teachers acting as role models, physical education curricula, preschool curricula, parent-teacher associations, and inservice sensitivity training
- Community organizations--including churches, libraries, scouts, YMCAs, parks, recreation programs, civic organizations, youth service organizations and youth sports programs, both competitive and noncompetitive
- Health care providers, including pediatricians--through pamphlets, advice, and continuing medical education
- Print media--including magazines and tabloids for children and parents
- Electronic media, including television, radio, and other sources of music that can provide positive role modeling in both commercials and programming
- Business and industry, including food manufacturers and restaurants, insurers, advertisers, cafeterias, and child care programs in large companies
- Child care providers
- Civic associations

The group also recommended the following Government actions.

- Restructure USDA commodity pricing, for example, by removing the subsidy for producing whole milk.
- Offer tax credits and incentives for targeted behaviors, such as worksite fitness programs.
- Mandate daily physical education in schools.
- Modify school lunches.
- Build bike paths.
- Use school facilities for the community after regular school hours.

Additional Recommendations

- Gather up-to-date data on various segments of the target audiences regarding topics such as food consumption and physical activity levels to help define messages. For example, it is not known how active children are now, so it is difficult to know whether it will help to tell them to be more active.
- Convene a panel of experts to make recommendations to pediatricians and other physicians about the prevention and treatment of obesity in children. Parents can be alerted to weight problems before they become severe and be given assistance in dealing with them.
- Work with food manufacturers and other industries to stimulate more changes.
- Recognize diversity of weight in children as with height and skin color. Focus on how to make them healthier, as opposed to thinner, especially because making them thinner often does not make them healthy.

Group members: John C. McGrath and Leonard H. Epstein, Ph.D. (group facilitators); Lilian Cheung, D.Sc., R.D.; Marguerite Evans, M.S., R.D.; Sue Y.S. Kimm, M.D., M.P.H.; Paula Keyes Kun, M.S.; Eva Obarzanek, Ph.D., R.D.; Patricia Reeves, R.D.; Claire Regan, M.S., R.D.; James F. Sallis, Jr., Ph.D.; Elizabeth H. Singer, M.S.; Denise Sofka, M.P.H.; Nancy Summer; Maggie Pettersen, M.S. (recorder).

SMALL GROUP REPORT: ADOLESCENTS

Target Audience Overview

Adolescents, for purposes of identifying specific target populations, can be broadly considered in terms of the following.

1. **All adolescents.** With a population-based approach and for primary prevention, the overall audience should be segmented and targeted by developmental stage:
 - Preadolescence: fourth and fifth grade
 - Adolescence: junior and senior high school
 - Postadolescence: post-high school and college
2. **High-risk adolescents.** With a high-risk approach and for secondary prevention, the following groups should be specifically targeted.
 - Obese adolescents
 - Adolescents with eating disorders
 - Sedentary adolescents
 - Pregnant teenagers

Priority Targets

The possibility of targeting males and females separately was discussed, but the group did not decide whether this was necessary or desirable. The group acknowledged that it might be necessary to target specific social and cultural groups within the school-grade developmental stages as well as individuals who were not in school. Of particular concern to the group was the fear that national messages on obesity and weight might further stigmatize high-risk adolescents. The group agreed that the emphasis should be placed on primary prevention and that all adolescents should be seen as priority targets.

Content of Appropriate Messages

The group discussed specific types of messages for all adolescents concerning weight, weight control, healthy eating, and physical activity.

Messages Concerning Weight

- Normal development
 - Reinforce the idea that their bodies and dimensions are changing.
 - Evaluate what is being taught in schools.
 - Include this subject in science curricula and health education, not just in family planning classes.
 - Promote messages throughout the curriculum.
- Broad range of safe weights and acceptable shapes
 - Remove the idea that weight should stop changing once height stops changing.

Messages Concerning Weight Control

- Weight acceptance rather than weight loss
 - Keep in mind that boys are trying to gain weight, while girls are trying to keep from gaining weight.
 - Remember that many adolescents are already sensitized to obesity and overweight.
 - Remember that focusing on weight loss may lead to body image disturbances, eating disorders, and decreased self-worth.
 - Educate teenagers on the range of healthy levels of body fat.
 - Keep in mind that using skinfold calipers is an invasive procedure, particularly to teenagers who are overweight.
 - Know that teaching weight acceptance may help prevent weight gain.
 - Keep in mind that the "Freshman 10" or "Freshman 15" (i.e., the 10- or 15-pound weight increase) that many high school graduates experience during their first years at college may be part of normal maturation or lifestyle changes. Evaluate what is being taught about this on college campuses.
- Healthy lifestyle choices
- Healthy eating and physical activity

The group considered the recommendation of lowering dietary fat to less than 25 percent of total calories as a means to control body weight (as proposed by Dr. Levitsky) but stopped short of promoting this message to teenagers. One member mentioned the public policy implications of imposing this diet (e.g., food labeling changes) as a deterrent. Another felt that diet should be viewed in the context of total

health, not just for the prevention of obesity, and suggested that messages should communicate the potential benefits of other dietary components (such as fiber) in reducing other morbidities.

Messages Concerning Healthy Eating

- Make healthy food choices.
 - Balance
 - Variety
 - Moderation
- Recognize hunger and satiety cues.
 - Eat when hungry; stop when full.
 - Learn to distinguish between emotions and true hunger pangs.

Messages Concerning Physical Activity

- It's not optional!
- Physical activity is not a spectator sport.
- There is a wide range of acceptable activities other than competitive sports.
- There is a wide range of acceptable outcomes or potentials.
- Ensure balance, variety, and moderation.
- Sweat is not gross.

Source Credibility

The group thought the following people and institutions are influential and could help motivate adolescents to act on messages concerning obesity.

- Peer groups (most powerful influence)
- Parents
- Role models
- Schools

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- Teachers (home economics, science, health, physical education)
 - Guidance counselors
 - Nurses
 - Foodservice workers
 - Administrators
 - Coaches/trainers

- Health care providers

- Government/regulatory agencies/NIH

The group recognized the need to educate and inform individuals or groups who will be communicating to teenagers to make sure that accurate and consistent messages will be delivered.

Motivational Strategies

The group identified specific motivational strategies relating to weight, physical activity, and healthy eating.

Strategies for Weight

- Educate teens about normal developmental stages.
 - Eliminate misinformation in schools.
 - Implement broad messages, and cross-promote healthy messages.
- Encourage family communication about weight expectations and acceptance.

Strategies for Weight Control

The group did not develop specific strategies for weight control.

Strategies for Healthy Eating

- Relate messages to image.
 - Make behaviors acceptable to peers (e.g., include healthy foods in more socially acceptable ways).
- Teach adolescents survival skills to accomplish goals by showing them how to:
 - eat healthfully at the school cafeteria and at fast food restaurants;
 - prepare healthy meals;

-
- read labels;
 - choose healthy snacks and beverages;
 - eat in relation to physical activity needs;
 - recognize advertising ploys; and
 - adopt the *Dietary Guidelines for Healthy Americans*.
- Provide motivators/rationale behind healthy eating outcomes.
 - Focus more on immediate benefits, but communicate distant health benefits as well.
 - Make sure what you say is true. (Will they really, for example, feel more energetic if they eat in a certain way?)
 - Communicate messages in teen dialect (English variation).
 - Keep messages up to date.

Strategies for Physical Activity

- Relate outcomes to image:
 - rhythm (dancing)
 - rosy cheeks (running)
 - fitness (aerobics)
- Teach adolescents how to accomplish desired behaviors despite barriers.
 - Peer acceptance (Show how physical activity can be social.)
 - Equipment/clothing (It's not critical, for example, to have \$100 air-pump sneakers.)
 - Environmental barriers (access and availability)
 - Time barriers (Show how physical activity can be part of a daily routine, such as walking to school or taking the stairs.)
 - Misinformation (Teach teenagers how to recognize false advertising.)
- Discuss outcomes/expectations
 - Provide information on immediate and distant health outcomes.
 - Communicate the truth. (For example, you might get sweaty when you exercise.)
- Encourage developmentally appropriate activities. (For example, weightlifting may not be appropriate for fourth and fifth graders.)

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- Show how physical activity can be FUN! (For example, dancing to MTV is fun.)

Channels for Communication

The group identified the following channels for communication:

- Print media
 - Magazines
 - Comics
 - Fiction/books
 - Clothing (for example, T-shirts)
 - Posters
- Electronic media
 - Television (talk shows, entertainment, advertisements)
 - VCR (tapes to target high-risk groups)
 - Music media (MTV, radio, cassettes, compact discs, videos)
- Face-to-face
 - Peer groups
 - Role models (Empower teens to become teachers.)
- Environmental
 - Schools
 - Community organizations (churches, recreation centers)
 - Parents' worksites
 - Kids' worksites
 - Food processors/restaurants
- Regulatory/intergovernmental communication/intra-agency cooperation.

Issues for Research/Evaluation

To improve and enhance the effectiveness of messages and strategies, the group recommended the following research and evaluations.

- Conduct formative evaluations of messages with teens.
- Evaluate channels and credible sources.

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- Determine current knowledge base and whether the data can help with health promotion efforts.
 - Evaluate whether the methods employed for changing knowledge, attitudes, and behaviors actually produce the desired outcomes.
 - Fund an ongoing evaluation.

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SMALL GROUP REPORT: ADULTS

Target Audience Overview

Adults, for purposes of defining--and limiting--target populations, can be considered in terms of several subpopulations. The group listed these subpopulations in the following broad categories:

- Age
 - Young adults 18 to 29 years
 - Middle adults 30 to 49 years
 - Older adults 50 years and over
- Education
 - Less than high school
 - High school
 - College and postcollege
- Socioeconomic status
 - Low
 - Medium
 - High
- Women
 - Employed outside home
 - At home
- Men
 - Single (does own cooking)
 - Married (usually wife does cooking)
- High risk: Existing cardiovascular disease risk factors versus no risk factors
- Weight: Currently obese versus not obese or overweight

Two additional subpopulations were considered. One was parous versus nulliparous women. The other was college-age individuals, who were covered in the discussion of the small group on adolescents but were discussed here in terms of whether the college-age population should be a specific target. Some group members

felt it was a low-risk population; others saw it in terms of less-educated versus college-educated women. The group agreed that the obesity problem is more common in the postcollege years.

Adult subpopulations listed but not discussed were smokers (these need to deal with smoking cessation first), minorities (these were addressed by the small group on minority populations), and familial obesity (efforts here will spin off from childhood strategies).

Strategies Overview

Before focusing on priority targets for the NHLBI Obesity Education Initiative, the group addressed broad and large-scale strategies (and messages) for the entire adult population. These strategies form the basis not only for adult efforts but also for all OEI activities.

Nutrition/Regulatory Strategies

The group agreed that the emphasis should always be on promoting healthy eating habits and patterns and that all messages should be kept simple. Broad nutrition regulatory strategies for all audiences and populations should focus on the following.

- **Placing understandable facts on labels.** Food labels will make more sense and be more easily understood when people learn what their allowance of total grams of fat per day is. Indicating percent calories from fat as well as calories and grams of fat per serving should be mandatory.
- **Educating the public on how to interpret information.** The NHLBI and other agencies should continue to take responsibility for educating the public and increasing their awareness of nutrition issues.
- **Emphasizing positive messages on what people *can* eat, not only what they should avoid.** Simple, broad messages can include "Eat more whole grains, more fruits, more vegetables," "At least five servings per day of fruits and vegetables," and "Follow food guide pyramid recommendations." Other appropriate messages are "Get fewer than 30 percent of your calories from fat" and "Make low-fat substitutions."
- **Stressing desirable versus undesirable foods.** Suggesting food substitutions as dietitians do is helpful ("Eat fruit instead of pastry"). Similarly, suggesting specific foods instead of nutrients is a useful, simple strategy ("Use jam instead of butter, skim milk instead of whole milk, chicken without skin").

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- **Improving accuracy in advertising** (using the Federal Trade Commission's role and labeling to add pressure to do so).
 - **Encouraging fast food restaurants, other restaurants, and supermarkets to offer lower- and low-fat food choices, and provide labeling information about their products.**

Physical Activity Strategies

The group agreed that to encourage the physical activity necessary for all audiences and populations, the messages should be kept simple and be attainable, as in, for example, the following.

- **Take the stairs.** A good place for this message to the public would be next to the elevator.
- **Walk 30 minutes a day** (if feasible and safe).
- **Spend 30 minutes a day in any physical activity;** that is, "Invest in your health." (In discussing specific suggestions on how much time should be spent in actual physical activity, one recommendation was 45 minutes a day. Most group members felt this was too much or too difficult. They felt strongly that if the goal seemed unattainable, no effort would be made to reach it.)
- **Substitute physical activities for television watching.**

Priority Targets

The group selected as priority targets the following adult subpopulations:

- **Women ages 18 to 65 of low socioeconomic status and with low education,** both at home and employed outside the home. The group saw a definite social class gradient in the prevalence of obesity in women. Thus, the consensus of the group was to focus on the women at highest risk (with different strategies needed for women at home versus those employed outside the home). Group members felt that the broad population strategies would be both sufficient and effective for women of medium to high socioeconomic status and with more education because these women are not at high risk for obesity.
- **Men ages 18 to 65.** The group targeted the total population of men because group members could not justify breaking men into socioeconomic and education subpopulations.

As it selected these priority targets, the group discussed the need to make those in the target audiences aware of what a healthy weight is. The group then explored the specific knowledge, attitudes, and behaviors in the target populations that need to be accommodated if OEI efforts are to be effective.

- **Knowledge.** *Women* in the target population are generally limited in their knowledge of cardiovascular and other diseases as hazards of obesity. They also have limited information about the importance of eating patterns and physical activity. *Men* are similarly limited in their knowledge.
- **Attitudes.** *Women* in general are more concerned with their appearance than men, with women in the target population more accepting of higher degrees of body weight than women in the higher socioeconomic and more educated populations. At-home women are less concerned with appearance than employed women, but women employed outside the home have time pressures affecting their eating patterns (more eating out for themselves and their families), their nutrition, and their physical activity. In addition, women employed outside the home usually have more social support for weight control. *Men* are more concerned with obesity as a health issue rather than a cosmetic issue, although many men think it is "natural" to gain weight as they get older.
- **Behaviors.** *Women* in the target population, particularly employed women, have time constraints that affect their physical activity and nutrition. *Men's* alcohol intake may affect their initiative for physical activity.

Content of Appropriate Messages

The group agreed that appropriate messages must concern healthy eating and other lifestyle behaviors--in particular, emphasizing that weight gain, is an unrecognized health hazard as people get older and that to prevent weight gain, exercise should be increased and eating patterns modified. Furthermore, because eating disorders (such as bulimia and anorexia nervosa) are usually not common in the target populations, the messages must be linked to the health risks of obesity.

Specific messages for the target populations concerning weight, eating patterns, and physical activity--all of which should be kept simple--were discussed and developed by the group as follows.

Messages Concerning Weight

- Don't gain weight/prevent weight gain.
- Try to be weight stable. Avoid major weight gains, and aim for stability.

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- Link weight to healthy behaviors, physical activity, and eating patterns.

The group discussed the possible negative effects of these weight messages, especially for young women. However, for the target populations, the issue of being too thin is usually not a problem. Furthermore, the message of body shapes (apple versus pear and abdominal obesity), which usually applies to people who are already obese--and which have not been shown to be modifiable except through weight change--need not be emphasized with this group.

Messages Concerning Eating Patterns

- Emphasize low-fat foods.
- Stress serving size. This is an important concept because the five-fruits-and-vegetables-a-day campaign and the daily food pyramid are overwhelming to many people unless they know what a serving size is. Thus, giving examples of serving size is very important.

Messages Concerning Physical Activity

- Be more active.
- Stress that every little bit counts. It doesn't have to be all at once.
- Invest in your health.

The group noted safety, cost, and lack of time as barriers to physical activity for the lower socioeconomic groups of the target populations. If these barriers are not broken down, most of those targeted will have an excuse not to exercise, and all messages will be ineffective. The group noted that community centers have exercise facilities and classes and that local malls have walking clubs. Walking with a partner, or walking a dog, can be a good motivator for regular exercise. Exercise programs are also available on television, although such programs are often at inconvenient times for the target populations. Exercise programs using VCRs may be a better tool for breaking barriers, especially if a company can be found to underwrite the cost of a VCR and videotapes. An investment in home exercise equipment (such as a stationary bike, treadmill, or Stairmaster) can be cost-effective in the long-term.

Source Credibility

The group discussed both credible and noncredible sources of information.

Credible Sources

The group identified the following as credible sources of information.

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- Physicians
 - Nurses
 - Clinical nutritionists and registered dietitians
 - Health care providers and health care organizations (for example, health departments)

The group noted that these professionals and organizations need to provide for their clients a great deal more information in the area of weight control. A good source of information might be industry, but the group felt that further investigation was needed to ascertain the best sources. The group also noted that there is a lack of any major organization (similar to, for example, the American Diabetes Association) for the target populations, which means that there is no advocacy group for obese people, and no guidelines, campaigns, or policies specifically for them. Instead, obese men and women get pulled into other groups--for example, cholesterol, diabetes, cancer, arthritis.

Noncredible Sources

The group discussed how to deal with noncredible sources, for example, some aspects of the weight loss industry. This is another area, the group felt, that needs further investigation. Data now indicate the ineffectiveness of commercial weight loss programs; however, data also indicate that weight control measures are not generally seen as efficacious by credible sources. One way to address this dilemma may be to stress safety issues related to diet programs and their nutrient content. Another may be to emphasize the data illustrating the poor results from weight loss programs. Yet another--which the group acknowledged would benefit everyone--may be to stress exercise and a healthy, low-fat diet, whatever your current weight. It may be possible to work with some weight loss programs to produce positive messages on healthy eating and physical activity. Furthermore, if public education programs stressed physical activity and healthy eating, and continued to show the statistics on poor results from weight loss programs, the weight loss industry might be influenced to change its tactics.

Some group members were not willing to endorse the message that the effects of weight loss, even if temporary, are bad and that participation in weight loss groups was bad. These members pointed out that often when obese people go to their family physician for information on weight loss, the physician will send them to a weight loss program for help. The group consensus was that no recommendations could be made about entering weight loss programs, other than that any such program should be chosen carefully because the efficacy of special diet programs has not yet been established. The cost of these programs also may be prohibitive for the target group.

Motivational Strategies

In addition to the broad, large-scale strategies already proposed, the group identified the following specific motivational strategies for the target populations.

- Stress self-efficacy.
- Emphasize more control over the environment.
- Provide education on health hazards.
- Stress healthy eating, and do not use the word "diet."

In addition, the group suggested that more information on motivational strategies needed to be obtained by using, for example, focus groups.

For Nontargeted Adults. The group further suggested strategies for nontargeted adult populations.

- **For young adult women in the childbearing years.** Communicate messages through clinicians (e.g., obstetricians and gynecologists) who come in contact with these women.
- **For young unmarried men.** Use general population strategies about nutrition and healthy food preparation and about eating out.
- **For high-risk groups.** Leave treatment strategy up to the clinician.
- **For familial obesity.** Carry over strategies directed to the obese children to the family through pediatricians and family physicians.

Evaluation. The group stressed emphatically that evaluation of strategies--as well as programs--is essential for success in reducing the prevalence of obesity and in controlling weight gain.

Audiences and Channels for Communication

Identified by the group as appropriate audiences and channels for communication were the following.

- Worksite programs (for employed women and men)
- Video programs, television exercise programs, and home exercise equipment (for at-home women)

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- Food labels
 - Peer groups (e.g., men at barber shops and other congregating areas)
 - Children (for women who can be reached through programs aimed at their children--e.g., WIC)
 - Churches and religious groups (for men and women)
 - Public health programs (e.g., Head Start, health departments, cooperative extension programs)
 - Media (e.g., television, radio, print)
 - Health care providers
 - Politicians (to be used with caution)
 - Mail (e.g., telephone bills, public utility bills).

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SMALL GROUP REPORT: OLDER ADULTS

Target Audience Overview

Older adults, for purposes of defining target audiences, need to be considered in terms of the various gradations of aging. The group listed the overall characteristics of the population of older adults as including the following.

- Age 65 years and older
- Growing population
- Preponderance of women
- Broad range of educational levels and socioeconomic status
- More leisure time
- Desire to remain independent

In addition, the population of older adults generally have decreased mobility, hearing, and vision as well as higher rates of chronic disease, malnutrition, social isolation, and Government assistance (e.g., Medicare and meal programs).

Older adults' attitudes toward weight (which apply to some but not all subpopulations of older adults) include the following.

- Less concern with overweight and about weight in general as it stabilizes or declines
- More concern about undesired weight loss, particularly in advanced ages
- Greater concern about health and less concern about appearance
- Perception of healthy weight as a means to reduce chronic disease
- A link between weight and mobility and independence

Behaviors affecting weight (which also apply to some but not all subpopulations of older adults) relate to the following.

- Activity level (choice of leisure activity, degree of mobility)

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- Caloric intake (cooking style, food selection). Older adults who are in nursing homes or who participate in senior meal programs have no control over either food selection or preparation. Other older adults have inadequate calorie intakes, and many eat alone.
 - Smoking
 - Alcohol
 - Drug use (both prescription and over the counter)
 - Forgetfulness
 - Depression
 - Degree of socialization

The amount of knowledge older adults have about weight affects their attitudes and behavior. The group felt more information was needed in this area. The group felt that cultural influences affect older adults' knowledge about weight. They also think older adults tend to feel that they are not getting fatter if their weight is stable.

Other factors also affect the weight and weight loss of older adults. For example, most older adults have a greater fear of injury and more difficulty exercising. They are also more susceptible to fad diets and gimmicks. As their ability and inclination to exercise decrease, they must put more emphasis on caloric restriction.

Physical activity for older adults is very important; it helps prevent the loss of lean body mass, promote mobilization and the redistribution of body fat, preserve strength and endurance, and maintain bone density.

Priority Target

The group saw the entire population of older adults as the priority target.

Content of Appropriate Messages

The group developed the following general messages for older adults.

- Gradual change will help make lasting change.
- Each individual has the ability to improve his or her health.

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- Physical activity and a healthy diet are necessary for good health.

The group also developed these specific messages.

- Body composition is more important than weight.
- Increased physical activity improves fitness and reduces cardiovascular disease.
- Eating a healthy diet is beneficial. (How to implement a healthy diet must also be part of the message.)
- Retirement is not a time to be sedentary.

The group also decided to develop a message about fat distribution because older adults are at high risk for cardiovascular disease. (Physicians must be trained to recognize the importance of fat distribution in adults, particularly older adults.)

Source Credibility

The group identified the following as credible sources of information on weight for older adults.

- Peers
- Medical and health professionals
- Community opinion leaders (e.g., directors of nursing homes, members of social clubs)
- Television, newspapers, and magazines (including advertising)
- Supermarket promotions and food labels
- Government agencies
- Medicare
- Senior centers
- Adult day care organizations
- Churches

The group needs more information before it can determine which sources of information most affect behavior.

Motivational Strategies

The group identified several possible motivational strategies.

- Emphasize fitness and a healthy diet.
- Provide positive reinforcement to older adults' efforts to maintain their health, independence and mobility, and dignity.
- Reflect cultural differences, and be culturally sensitive.
- Address climatic and environmental concerns.
- Address cost issues.
- Emphasize possible pain reduction.
- Recognize fear of ill health and death.
- Use models that encourage participation.
- Use models that are appropriate for the age group.
- Mobilize the community through such programs as Planned Approach To Community Health (PATCH).
- Create messages for specific subpopulations.

The group felt that prevention messages are not appropriate for this audience because it is usually too late for prevention. The group agreed that treating everyone the same is not a successful motivational method.

Channels for Communication

The group identified the following appropriate channels for communication.

- Advocacy groups (e.g., the American Association of Retired Persons)
- Government, military, and professional retirement organizations and facilities
- Medicare and Social Security

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- Insurance companies
 - Public utilities
 - Direct mail
 - Volunteer agencies and organizations
 - Health fairs
 - Health professionals
 - Waiting rooms of hospitals and physicians' offices
 - 800 and 900 telephone numbers
 - Supermarkets
 - Social gatherings and clubs
 - Private homes and retirement communities

Among the effective tools the group identified for these channels to use in delivering messages were television, radio, large-print reading materials, and one-on-one contact.

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SMALL GROUP REPORT: MINORITY POPULATIONS

Target Audience Overview

The four major minority populations in the United States--African Americans, Hispanic Americans, Asians and Pacific Islanders, and Native Americans--are the fastest growing segments in the total U.S. population. They also tend to exhibit the following demographic characteristics.

- High poverty rates
- High high-school dropout rates
- High teenage pregnancy and single parenthood rates (mostly women)
- Different distributions by states and clusters within areas
- Limited access to health care and food
- High levels of risk factors and high incidence of disease
- Variant health knowledge and practices, including:
 - Many misconceptions
 - Use of traditional/folk medicine and lore
 - General concerns about health, with a moderate to high awareness of diabetes and high blood pressure but a relative lack of awareness about weight
 - Associations between weight and family income and between thinness and illness
 - Different orientations to physical activity, with such activity not the norm, not valued, and mostly associated with the white population and affluence
 - More traditional and separate gender roles
 - A spiritual meaning attached to food
 - Hospitality revolving around food
 - Single parents doing less cooking
 - Heavy reliance on fast food restaurants
- An untapped market for products associated with increasing the risk of disease

Some of these characteristics (e.g., lower income and lower education level) are related to weight loss practices. According to the 1990 National Health Interview Survey (NHIS) of the National Center for Health Statistics, overweight individuals least likely to be dieting were those with less than 12 years of education and those

with family incomes of less than \$10,000 (National Center for Health Statistics, 1993). The U.S. Department of Agriculture's (USDA) 1989 Diet and Health Knowledge Survey (unpublished data) found that among female main meal planners/preparers, 73 percent of whites and 76 percent of African Americans considered maintaining a desirable body weight of high importance.

African Americans

Data reported by Bennett (1991) from the Centers for Disease Control's Behavioral Risk Factor Surveillance System (BRFSS) (1985-88) show that the prevalence of overweight for African-American women is twice that for white women.* The prevalence of overweight is similar for African-American and white men, except at older ages when overweight is more prevalent for African-American men 65 years and older.

According to the BRFSS data, weight loss practices among white and African-American women are similar. Increasing physical activity and eating fewer calories are the weight loss practices most frequently reported by about a third of the women of both races. However, research has shown that African-American women do not lose weight as easily as white women (Kumanyika et al., 1992).

Data from NHANES II indicate that obesity (defined as triceps skinfolds greater than or equal to the 85th percentile of children of the same age and sex) among African-American boys remains substantially less prevalent than among white boys (Gortmaker et al., 1987). For boys 6 to 11 years old, 16.6 percent of African-American boys were overweight versus 31.5 percent of white boys. For 12- to 17-year-olds, 12.7 percent of African-American boys were overweight versus 19.5 percent of white boys. The prevalence of obesity among African-American girls is quite similar to the rate for white girls. For girls ages 6 to 11, 20.9 percent of African-American girls are obese versus 26.0 percent of white girls. For 12- to 17-year olds, 25.1 percent of African-American girls are obese versus 25.6 percent of white girls. African-American adolescent girls are dieting and are preoccupied with weight, but not as much as white adolescent girls (Serdula et al., 1993).

According to the Food and Drug Administration's (FDA) 1992 Weight Loss Practices Survey (Levy and Heaton, 1993), adults over 18 years of age in African-American households who were trying to lose weight fasted and used diet pills,

*According to recently released preliminary data from the NHANES III (1988-91) (National Center for Health Statistics, 1994), the age-adjusted prevalence of overweight for African-American females is 50 percent (versus 34 percent for white females). The age-adjusted prevalence of overweight is approximately the same for African-American and white males (32 percent).

laxatives, and fiber supplements more often than their white counterparts, and they were also more overweight. In a National Institutes of Health study on binge eating disorders by Yanovski and colleagues (1992), bingeing was equally high among African-American and white women. African-American adolescent girls do not use smoking as a means of weight control, but a substantial number do binge, fast, and purge.

For most African Americans, food is more than nutrients; it is the focal point of family gatherings. It eases stress and is associated with prosperity. The feast (at the beginning of the month when more money is available) or famine (at the end of the month when resources dwindle) cycle often dictates the behavior of low-income African Americans.

African Americans--except for males up to age 25--generally are not physically active. Some of the reasons include lack of time (particularly in single-parent families), concern for safety while exercising, and the cultural belief that exercise is selfish because it takes time away from family responsibilities. However, according to the FDA's 1992 Weight Loss Practice Survey, African Americans who are dieting do exercise as much as whites, and for them the most common form of exercise is walking.

Hispanic Americans

Overweight is common among Hispanic Americans. According to the Hispanic Health and Nutrition Examination Survey (HHANES), 29.7 percent of Hispanic men and 39.1 percent of Hispanic women are overweight (National Center for Health Statistics, 1989).*

In the Hispanic culture, being heavy is associated with being healthy, whereas thinness is associated with illness. A chubby baby, for example, is viewed as a healthy baby. In addition, many traditional songs link heaviness with health. For Hispanic women, weight traditionally has been linked with sexuality and marriage; before marriage, Hispanic women are thin. The group suggested that Hispanic women gain weight after marriage as a security blanket to avoid aggressive men, which in turn makes husbands less jealous. This pattern is thought to be slowly changing.

*According to recently released preliminary data from the NHANES III (1988-91), 48 percent of Mexican-American females and 40 percent of Mexican-American males are overweight (National Center for Health Statistics, 1994).

Asians and Pacific Islanders

Asians and Pacific Islanders are not represented in most national health and nutrition surveys; therefore, there is a paucity of data on the overall prevalence of obesity for this group. Data on overweight among Japanese and Filipinos come from the 1986 BRFSS in the State of Hawaii (Hawaii State Department of Health, 1986). Based on self-reported data, the prevalence of overweight is lower among Japanese and Filipinos (13.0 percent and 8.3 percent, respectively) than among whites and other minorities.

The group felt that Asian-American children generally are not obese, although they have a higher body weight than those from previous generations and remain small in stature. It was felt that Asian-American children want to be like Americans and eat at fast food restaurants and participate in school lunch programs, but their parents tend to retain their traditional diets. One reason is that they may not always have the knowledge or resources to prepare foods common to the American diet. Another is that language can be a barrier, particularly for some recent immigrants. Yet another reason is that many times food combinations eaten in the typical American diet are not acceptable in terms of traditional hot and cold food practices. However, Asian-American parents want their children to be strong and taller in stature like Americans. Physical activity also is counter to the accepted Asian-American culture.

Native Hawaiians, on the other hand, suffer from disproportionately high rates of obesity (Aluli, 1991). In a 1985 cardiovascular risk factor survey of Native Hawaiians, 65.5 percent of males and 62.8 percent of females in the study populations were classified as obese (Aluli, 1991). Using the body mass index measures employed by the NHANES II, the overall obesity rate was 63.6 percent in this Native Hawaiian group, with severe obesity occurring in 46.4 percent of males and 33.9 percent of females (Aluli, 1991). Overweight occurred earliest in males: 79.2 percent of those ages 25 to 34 were overweight. Obesity was greatest in older women, with 83.9 percent of these 45- to 54-year-olds overweight (Aluli, 1991; Curb et al., 1991). The self-reported data of the 1989 Hawaii BRFSS show Native Hawaiians with the highest percentage of obesity at 40.2 percent, compared with the overall State prevalence rate of 20.9 percent (Hawaii State Department of Health, 1991).

The current situation represents a drastic change from traditional times, probably brought about by the complete westernization of the diet and lifestyles of Native Hawaiians today. Obesity was not a problem in traditional times. Native Hawaiian men were described by the first visitors to the Islands as "tall, well made, with finely drawn muscle," "a joy to behold" (Mortelier, no date), and "above middle size, strong, muscular, well made of dark copper colour . . . [who] walk gracefully,

run nimble, and are capable of bearing great fatigue" (Beaglehole, 1967). Older men were reported to be heavier but tall enough to carry their weight (Beaglehole, 1967).

All available obesity data on Native Hawaiians are those gathered while researching other health conditions in this Native American population. Although existing data sets often are not comparable because of different research methodologies and measurement, recent data consistently corroborate higher rates of obesity and disproportionately higher rates of age-adjusted mortality for chronic diseases compared with the U.S. all-races rates of obesity (U.S. Congress, 1987). Directed research is essential to elucidate the role of obesity as a risk factor and to ascertain means to reduce these health disparities.

Native Americans

Native Americans also are not represented in most national health and nutrition surveys, and as a result, there is a paucity of data on the overall prevalence of obesity in this group. However, using several sources of existing data, Broussard and colleagues (1991) have estimated the prevalence of overweight and obesity in American Indians and Alaska Natives. Based on self-reported data, the prevalence of obesity was 33.7 percent in adult males and 40.3 percent in adult females. These data also suggest a secular increase in pediatric obesity in the Native American population.

Limited resources, access to grocery stores, choices of foods in available stores, and refrigeration result in dependence on commodity foods. These foods are generally high in fat, saturated fat, and calories. Isolation, a high unemployment rate, extreme weather conditions, and a lack of recreational facilities all contribute to television being used as a means of entertainment and occupying idle time. Binge drinking presents health and safety problems. Depression and fatalism concerning predispositions to developing diabetes and alcoholism are common. Diabetes rates for Native Americans are higher than for other ethnic groups (Gohdes et al., 1993). Furthermore, few Native American health professionals are available to help address these and other problems.

Data are not available on the weight loss practices of the adult Native American population. However, in adolescents in both urban and rural environments, weight loss behaviors associated with eating disorders such as frequent dieting, food binging, self-induced purging, and use of laxatives and diet pills were reported (Smith and Krejci, 1991). Differences between rural and urban Native Americans in socioeconomic status and access to health care need further study to design appropriate messages.

Priority Targets

The group suggested that the overall priority for the NHLBI Obesity Education Initiative should be to target African-American women ages 20 to 25 because this population has a particularly high prevalence of overweight. Adolescent African-American girls also should be a priority target--in terms of primary prevention--because excessive weight for this population begins at puberty. Other primary prevention target populations include Native Americans, Asian Americans, Native Hawaiians, and Hispanic Americans, the youngest and fastest growing segments of the U.S. population. Because of the traditional gender roles and the strong family units in minority cultures, women should be the target for messages on healthy eating and men for messages on physical activity. The overall goal should be to give these populations a sense of empowerment and to increase their self-esteem.

Content of Appropriate Messages

The group felt that more research needs to be done on what the most appropriate messages are for each minority because there needs to be an understanding of the underlying reasons by population group and by age. It is recommended that established local networks within each minority population be utilized to help in message development. The group felt that it was essential to segment the populations according to country of origin, how long they have been in the United States, and their degree of acculturation. The group also recommended that efforts begin with a massive campaign to raise awareness, followed by targeting individual lifestyles for change. Most likely the focus of the different groups could be combined because they share similar characteristics.

In developing messages for minority populations, it is important to note that the traditional methods of treatment have failed, and as a result, most people feel cheated. The group felt that quality of life, including how to live better and help each other, and family and community values should be emphasized. An essential message to convey is that overweight is not a sign of good living; the notion of weight loss for "feeling good" versus "looking good" should be emphasized. As already noted, for adolescent girls and women, self-esteem and empowerment should be stressed. All messages should be simple, easy to understand, and tested with focus groups for relevance.

Appropriate to include in messages are the following.

- Recognition of traditional culture, particularly those cultural elements that can enhance the message
- Economic and diet issues

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- Food as security
 - Food as fitting in
 - Feast or famine
 - Food and its role in celebrations, rewards, happiness, spirituality
 - Substitution versus dramatic changes
- Physical activity promoted through lifestyle changes that have no cost ("burn it off") in relation to gender, role models, real activities
 - Attractiveness
 - Fun
 - Real-world skills (e.g., how to select healthy food from a fast food restaurant)
 - Choice
 - Incorporation into family activities throughout the life cycle, especially preparing and buying foods

For African Americans

Messages for African Americans should emphasize lifestyle changes and physical activity to lower risk factors instead of weight loss. Messages should also be family- and church-oriented. They should emphasize small, appealing changes in diet (substitutions versus large changes in food selection) and physical activity. Messages to adolescents should include the ideas that health is attractive and gives you strength, that eating gives you energy and can be fun, and that attractiveness gives you self-esteem. Education and training on budgeting and planning need to be included to break the cycle of feast or famine.

For Hispanic Americans

Family and friends are very important to the Hispanic-American population. Messages should focus on how the desired behavior will empower and help the family, not just one individual. Messages should be directed to women about making dietary substitutions versus trying something new. Fat, saturated fat, and calorie levels, for example, can be reduced easily by making the small change of substituting yogurt for sour cream in traditional recipes. The relationship between exercise and health also should be emphasized. Messages linking weight with mortality may help change perceptions about weight. Short messages with visuals should be employed.

For Asians and Pacific Islanders

Asians and Pacific Islanders should be targeted for a primary prevention message because overweight is not a major problem for most of this population. However, it could become a problem in the future if appropriate steps to prevention are not taken. Native Hawaiians should be encouraged to return to the "body image" of the traditional Hawaiian. (Obesity was not a problem in traditional times.)

For Native Americans

Messages for Native Americans should emphasize lifestyle changes and physical activity to lower risk factors instead of weight loss. Messages need to convey that healthy eating is neither expensive nor a drastic change from current habits. Low-fat substitutions for high-fat foods, reductions in quantity, and changes in preparation should be emphasized while maintaining the notion that eating is fun and food tastes good. Education on budgeting and planning are important. Community involvement is essential to successful messages. Community health representatives should be used to disseminate materials. Native Americans are ultimately responsible for their own health and should be involved in determining the message and messenger.

Source Credibility

Minority populations receive information from family (including extended family) and friends, physicians and pharmacists, community health workers (peers and local organizations), local networks (lay and professional education), churches, and the media (local community newspapers, magazines, and television). For adolescents, television is particularly popular. However, all cultures can be reached using television if populations are segmented. Specifically, credible sources for each population are listed below.

- For African Americans: Physicians, churches, magazines, sports figures, celebrities, musicians (especially female rappers to young women), extended families and friends (especially to young women), and pharmacists
- For Hispanic Americans: Family, friends, physicians, churches, and the media
- For Asians and Pacific Islanders: Churches, local community papers, ethnic grocery stores, and the media
- For Native Americans: Health clinics, tribal leaders, powwows, traditional healers, friends, community health representatives, and WIC programs

Motivational Strategies

Strategies for motivating the various minority groups to act on information should incorporate and emphasize the following.

- Family
- Community contribution
- Self-enhancement/benefits
- Positive reinforcement
- Empowerment
- Retention of ties to traditional culture
- Fun
- Skill training
- Environmental changes
 - Cues to physical activity
 - Improving access--community/business
 - School lunch, commodities
 - Grocery stores, restaurants (especially fast food)
 - Dance, music

For African Americans

Strategies for African Americans should address the lack of access to and high cost of groceries in the inner cities. Primary prevention efforts should promote healthy eating patterns, with "fun" messages coming from peers, pharmacists, church leaders, senior centers, television, and music. To promote physical activity and strength for boys, participating in sports without using steroids should be encouraged.

For Hispanic Americans

All strategies for Hispanic Americans should focus on the family because of its strong influence in this culture.

For Native Americans

Intervention strategies for Native Americans should emphasize healthful eating and physical activity and allow them to make their own choices to give them a sense of self-empowerment. Stress should be on integrating traditional ways, such as running, dancing, and race walking for physical and spiritual fitness. Messages on physical fitness should emphasize strength because the Native American's orientation is to what can be done for the next generation and the good of the tribe versus oneself. Messages also must consider religious and spiritual beliefs.

Work to initiate any type of change must simultaneously address leaders of the tribal government who can support individuals' efforts to change. Efforts should include changing the composition of the commodity foods provided and working with the tribal community to change the foods available in the grocery stores. Prevention efforts must begin early--including prenatal education--and school health initiatives must begin before high school because the high school dropout rate is high.

Awareness of obesity's association with diabetes and awareness of diabetes in general have been enhanced by major health initiatives by the Federal Government. These efforts should be expanded and enhanced. Efforts also should be made to link obesity to diabetes, heart disease, and other obesity-related chronic diseases.

To develop a strategy on physical activity, a needs assessment in various communities may be worthwhile to find out from the community what physical activities are suitable. Messages need to include the traditional Native American symbols of heroism, such as runners and dancers.

Channels for Communication

Messages to minority populations should generally be targeted to the following.

- Immediate and extended family members, especially older family members (such as the aunt or grandmother) to target to younger members
- Physicians
- Community health workers
- Local organizations
- Local community newspapers and magazines
- Established professional and educational networks

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- Mass media
 - Fast food restaurants serving healthy foods that taste good

For African Americans

Messages for African Americans should be directed primarily through physicians and magazines. Mass media messages should be specifically targeted through sports figures and rap singers, especially for adolescents and young adults. Connections should be made with dancing and music. Interpersonally, information channels should include peers and allied health professionals such as pharmacists, community and lay health workers, senior citizen centers, fraternal organizations, and other African-American networks. Although many African Americans do depend on their physicians, not enough training on weight control is provided in medical school. Health messages printed on hand fans disseminated in churches have been used effectively in some communities to increase awareness.

For Hispanic Americans

Radio, followed by television, is the electronic medium used most often by Hispanic Americans. Print materials are not used as widely; when they are developed, they should be bilingual. Health messages on calendars that include a picture of the homeland have been used in some community settings. Ethnic grocery stores are places where Hispanics seek out information. Messages also may be channeled effectively to families through a facilitator from their community.

For Native Americans

Efforts need to be channeled through the established leaders of the tribal governments such as community health representatives and nutrition aides. Other channels for Native Americans include reservation trading posts and grocery stores, local cable television, and local newspapers.

For Asians and Pacific Islanders

Print material is very important to the Asian-American community and should be multilingual. Some segments of this population do not have a written language; therefore, videotapes in their native language are appropriate. Other channels can include local newspapers and health messages printed on fly swatters or calendars with a picture of the specific population's homeland.

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These issues related to obesity and minority populations also were raised for discussion at the February 1993 meeting of the NHLBI Ad Hoc Committee on Minority Populations. The comments by the committee have been incorporated in this document, and their input is greatly appreciated.

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